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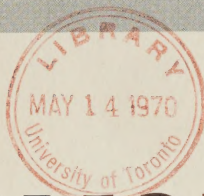
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CANADIAN FARM ECONOMICS

TRENDS AND PROSPECTS FOR CANADIAN AGRICULTURE WITH EMPHASIS ON HORTICULTURAL PRODUCTS

G. R. Purnell and J. R. Burns

Although the primary sector of agriculture is declining in social, political and economic importance, it is still a very important part of our Canadian economy, and the overall significance of agriculture is emphasized when one includes agri-business. Primary agriculture is the fifth largest employer of workers in Canada and when related industries are included, 25 per cent of the working force is accounted for. Primary agriculture is seventh among sectors contributing to the gross domestic product, and when agri-business is considered, along with the multiplier effect, it is obvious that agriculture in Canada is one of the most important elements (1).

This very importance and the interrelationship of agriculture with other areas of economic activity are underlying reasons for the public attention currently focused on agriculture and its problems; yet, when one looks at agriculture carefully, it is noted that the very success of agriculture in Canada is its biggest embarrassment. Adoption of new technology, changes in resource combinations and the resultant increased productivity create farm surpluses which depress prices and incomes. Certainly benefits of the predicament accrue to the consuming public because of the better quality and the increased variety and quantity of food at low costs.

On the other hand, farmers faced with declining net income must become more efficient and/or increase farm size, or leave farming. These decisions are made every day by more and more farmers. Farm productivity per worker is rising faster than is productivity outside of agriculture; farm size is increasing significantly as measured by acres, investment or gross income; and farm numbers are declining by 2 per cent per year. Recent studies suggest that, by 1980, "... food production and population will increase by 30 per cent, Canadians will be spending only 18 per cent of their dollar on food compared with 20 per cent now, there will be one-quarter less farms with ... bigger and more specialized operations ... "(2).

HORTICULTURE AS AN ALTERNATIVE

Imports of horticultural products were valued at \$367 million in 1968, about 34 per cent of the total value of Canadian agricultural imports. Given this fact, the trend of consumers to eat more fruit and vegetables per capita and the problem of heavy surpluses of wheat, barley and other commodities, some farmers are looking at the possibility of shifting into vegetable or fruit production. Naturally, there are severe physical limitations to the volume of such shifts and, in addition, there are fairly high economic obstacles. Often these latter hurdles are overlooked by individuals and groups who study the situation. Various regions or areas in the country quite rightly and carefully evaluate their physical potential and even the economics of production compared with competing areas, yet one major mistake in the feasibility process arises. Each study assumes that the production from its area will capture the necessary share of the market. There just are not that many shares of large enough size to go around. The result of the whole series of optimistic recommendations arising from regional studies of production and processing may encourage surplus production. There appears, therefore, to be a need for national analysis or, at least, co-ordination of the various recommendations.

The producers and the industry also need short-, medium-, and long-term outlook information on the prospects for fruit and vegetables. This paper deals with the situation and outlook in commodities of concern to fruit and vegetable producers.

TRENDS AND PROSPECTS FOR FRUIT

Apples

Many apple-producing countries in the northern hemisphere produced appreciably larger crops last year, continuing a world trend generated by increased plantings, greater specialization, a selective develop-

TABLE 1—ESTIMATED PER CAPITA CONSUMPTION OF APPLES, CANADA, AVERAGE 1964-66 AND PROJECTIONS TO 1975 AND 1980

	1964-66	1975	1980
		pounds	
Fresh.....	26.5	27.0	27.0
Processed (fresh equivalent).....	13.5	17.0	19.0
Total (fresh equivalent).....	40.0	44.0	46.0

ment of varieties and generally better cultural programs. Similarly, southern hemisphere countries, particularly South Africa and Australia, as a result of recent plantings, are now producing significantly larger crops.

Production in some areas has been expanding dramatically—in France, it is about double what it was five years ago. Although the United States is the world's largest producer, and increased production during the 1956-66 period at the rate of 1.6 per cent a year, crops were below average in the past few years. However, in 1969, U.S. production rose to a record high. Canadian production also increased during the period 1956-66, but at a much greater rate, 2.4 per cent per year. Canada's production in 1969 was larger than in 1968, but smaller than the ten-year average.

The regional picture in Canada is somewhat similar. Production is increasing in each province (3). Yields, rather than plantings, have increased nationally and those in Quebec have improved so much that the average production increased by 56 per cent between the two five-year periods, 1957-61 and 1962-66. Production increased 32 per cent in British Columbia and 30 per cent in Ontario in the same period.

Medium-term Outlook—The Canadian apple industry will continue to be heavily influenced by world, especially North American, production and trade. The upward trend in world production will continue principally in the United States, Western Europe, and southern hemisphere countries. Apples and apple products from European and Asian countries will be increasingly evident in Canada and in Canadian export markets.

As a result of the increased supplies and competition, exports from Canada will continue to decline, especially those to Western Europe. However, small increases in exports to other world markets will help reduce the overall rate of decline. The United States, which, until recently, was Canada's second most important export market, has now assumed first place and will be of increasing importance in the future.

Improved processing technology and higher disposable incomes will result in a larger portion of the

crop being processed. As well as an appreciable increase in processed apple consumption, there will be a slight increase in fresh apple consumption during the next few years (Table 1). Total domestic consumption in 1975 is estimated at 23 million bushels and in 1980, at 26.6 million bushels (4).

Canadian apple growers must prepare to face the problems of large increases in production. Potential yields combined with favorable growing conditions could result in crops of 1.4 billion pounds (31 million bushels) in the near future. Such crops would be about 44 per cent larger than the 1962-66 average. With such a potential supply and little prospect of equal demand, no further plantings should take place, other than to maintain production or to match variety to consumer preference, for the next few years.

Other Fruit

After apples, the five next most important fruits, in descending order of importance, are strawberries, peaches, cherries, grapes and pears. The production of these fruits is supplemented by imports. Only in the case of fresh blueberries and raspberries does Canada export more than she imports.

Compared with all fruit at 41 per cent, a large portion of these crops, ranging from about 43 per cent in the case of strawberries and peaches to 80 to 90 per cent for grapes and raspberries, is processed annually (5). Average farm values and minimum prices for processing for most of these fruits have been trending upward, with most prices in the past three years above the 1962-66 average.

Strawberries—Canadian producers are finding it more and more difficult to compete with low-cost foreign strawberries imported for processing. As a result, larger proportions of imported berries will be in the Canadian packs. Fresh market prices will continue to attract Canadian production for both the home and nearby export markets. The Maritime provinces have a natural advantage in being able to produce at the end of the season and to sell to large nearby United States markets. Provided that harvest

labor is available, fresh exports from this area are likely to continue to increase.

Peaches—The almost unbroken upward trend in world peach production has been largely due to increases in European fresh dessert varieties and in southern hemisphere canning varieties.

Although Canadian peaches have long been important to processing production lines, the quantity going to processors is declining and will likely continue to decline, both as a percentage of the crop and in absolute terms. Many of the trees currently in production may not continue to withstand the rigors of severe winters. Until suitable varieties and rootstocks are developed, peach processing can only continue subject to the wide fluctuations in the Canadian supply.

Potential world production, particularly the latent potential in the United States, strongly suggests no expansion in peach acreage in Canada, but some new acreage may be required to maintain production lost through urbanization.

Cherries—Sour cherry production in Canada comprises the greater proportion of total cherry production. Almost all of the production is in Ontario, although there have been some encouraging gains in British Columbia in recent years. Although sour cherry production is larger, sweet cherries usually command higher prices in both the fresh and processing markets. Most sour cherries are processed but substantial quantities find their way to the fresh market at favorable prices.

The last two censuses of sour cherry plantings in the United States showed marginal increases, a continuation of an upward trend. Canadian plantings have also been increasing and surplus production is a possibility if weather and other cultural conditions are favorable. The perishability and the difficulty in packing sweet cherries for long distances tend to limit off-shore exports; therefore, further plantings of both kinds of cherries in Canada should be limited to areas most favorably competitive with the United States.

Grapes—Grape production has been showing a definite uptrend since the late 1950's. About 90 per cent of all grapes grown in Canada, and about 75 per cent of the grapes used in Canadian wines, are grown in the Niagara area. Acreage and production in British Columbia, although comparatively small, are nevertheless increasing sharply.

Some grape acreage will be lost to urban and industrial land uses in Ontario but improved cultural practices will increase yields on the remaining land. In British Columbia, total acreage will show some increase in the next few years to meet the needs of an expanding wine industry. There are several possibili-

ties which lend optimism to the longer-term outlook. New grape products appear to be stimulating the demand for processing grapes. Canadian consumption of wines is on the increase and recent changes in the composition of the population in certain parts of Canada have introduced new consumption patterns, not only by virtue of the new arrivals, but also through their influence on Canadian consumers. New hybrids, similar to those now imported for home wine-making use, are being developed for cultivation in Canada. Such new varieties, combined with promotional programs, will help reduce the huge imports of grapes for wine making.

Pears—There is a strong upward trend in the world production of pears. Table pear production is rising fast in Italy, France and Australia. Production is also expected to continue increasing in the United States. Under these circumstances, further plantings of pears should be confined to the renovation of less efficient orchards with varieties other than the Keiffer strains. *Other Fruit—Summary*—The world production outlook for pears, peaches and cherries indicates clearly that caution is necessary when considering further plantings. For fresh strawberries and processing grapes, however, the immediate future is a little brighter. The application of new processing techniques should increase consumer acceptance of most processed fruit products but imports, both fresh and processed, will continue to supply a large part of the demand.

TRENDS AND PROSPECTS FOR VEGETABLES

Potatoes

Potatoes are the most important of the vegetables produced in Canada, accounting for almost two-thirds of the value of all vegetable production and about 3 per cent of Canadian farm cash income. Regionally, income from potatoes is most important in the Maritimes, where it represents 30 per cent of all farm cash income, compared with other regions where it is from 1 to 4 per cent of farm cash income.

Over time, Canadian potato production slightly exceeds consumption. Canada normally has both exports and imports but net exports average from 5 to 6 per cent of production. Per capita consumption in total has been quite stable, with declines in fresh consumption about offset by the rise in consumption in processed form. However, the lack of recent data prevents a continuing assessment of this trend. With increasing population, total consumption of potatoes nevertheless has increased considerably.

In a recent Economics Branch study (6) on the variability of production, marketing and prices for potatoes in comparison with nine other commodities

(apples, wheat, oats, barley, corn, soybeans, eggs, hogs and cattle), on a national basis, it was found that production of potatoes was relatively stable in that it ranked eighth in production variability with a coefficient of only 6.9 per cent. It was also shown that the growth in potato production was 2.88 per cent per year. Potatoes ranked well down, in seventh place, in marketing variability, with a coefficient of variability of only 7.6 per cent. When it came to farm prices, potatoes were the most variable, with a coefficient of variability of 27 per cent.

The problem of widely fluctuating and frequently low prices and incomes is serious for potato producers. This instability results from a combination of the inelasticity of demand and the variations in production. Because consumers want about the same quantity of potatoes from year to year, regardless of price, a given percentage change in quantity available is accompanied by an inverse and greater change in price. This inelastic demand is then quickly reflected back to the farm price. For example, a little more going to the market than would produce a reasonable return rapidly results in reduced prices and hence, depressed income. Conversely, a little less going to the market should tend to result in higher prices and incomes, unless there is an inward flow of potatoes from other production areas.

Recent average yields in the United States have been higher than those in Canada. The average yield in Maine for the three most recent crops was about 233 hundredweights per acre. For the Maritimes, it was about 207 hundredweights. With larger acreage and about 50 per cent higher production, the Maine potato supply has a large influence on Eastern Canadian prices. The average yield for the nine western states (fall production) is about 239 hundredweights per acre, slightly higher than in Maine. Idaho average yields vary between 195 and 320 hundredweights, but Washington State yields average 388 hundredweights. Washington is now the third largest producer, with the highest average yield in the United States. The advantage over the main Western Canadian provinces (Manitoba, Alberta and British Columbia), the yields of which ranged from 109 to 202 hundredweights in the past five years, is readily apparent. Late summer production yields in Washington and California, which were between 350 and 360 hundredweights per acre, also offer stiff competition to early potato crops in British Columbia and the Prairies. While much of the late summer production in Washington and California goes to processing, the price of potatoes in the western provinces appears to be set in these two states.

Medium-term Outlook—The marketing of the Canadian potato crop will continue to be largely influenced

by United States supplies and prices. The fall crop in the United States is more than four times larger than the Canadian crop. The U.S. also produces five other seasonal crops, so that the total potato production in that country is five times larger than in Canada. Sometimes the marketing of these crops in the United States clash causing sharp fluctuations in supplies and prices, both in the United States and Canada. The high average yields for the more important, late summer and fall producing areas in the United States will continue to provide the basis for stiff competition, particularly in Western Canada, for some years to come.

Table and seed potatoes, mostly from the Maritimes, will continue to have difficulty competing in the United States because of the small annual quotas and the U.S. import duty of 37.5 cents per hundredweight. When quotas are filled, the import duty increases to 75 cents per hundredweight.

Farm prices for potatoes will continue to be subject to wide fluctuations with resultant instability in income to producers. As in the past, this will have a greater effect on the incomes of potato growers in the Maritimes.

There are, however, recent signs that growers in the Maritimes and Ontario are beginning to look at group action to stabilize prices and farm incomes. As well, there will be moves toward consolidation of acreages rather than acreage increases, with resulting economies and productivity.

Processed potato products will be more important to potato growers in the future as the general level of per capita income increases and more is spent on convenience foods. Although data for potatoes used in processing are incomplete, there are other indications, including increases in contracted acreages and potato processing facilities, that point to more potato processing in the future. The proportion of potatoes going into processing has been increasing since 1957 and this will likely continue, but at a declining rate.

Improved varieties, better cultural practices and the new seed potato certification program will help expand domestic consumption and export potential for seed and for processed potato products.

Unlike apples, potato production seems to be expanding faster than the current rate of population increase in both Canada and the United States. This could lead to surplus conditions throughout North America.

Other Vegetables

The latest available estimates indicate that there are at least 238,000 acres of land under cultivation for vegetable production in Canada. Current trends point to a continued expansion of production and

consumption. Acreage is increasing and the volume of production for most vegetables has been higher in the past three years than during the five-year period 1962-66.

There have been noticeable increases in the imports of most fresh vegetables. There have also been increases in exports. On a net trade basis, there are a few fresh vegetables, such as beets and rutabagas, in which Canada is a net exporter and some, such as carrots and onions, in which Canada's net trade position is improving. However, the quantity of fresh imports over exports is continuing to increase.

Exports of frozen vegetables (including potatoes) are above the 1962-66 average, although potatoes appear to be declining. Exports in 1968-69 were much weaker than the year before, a large part of the decrease being frozen potato products. Imports of all frozen vegetables were higher than the 1962-66 average but, during the last 10 years, Canada's trade position on frozen vegetables changed from a net importer to a net exporter.

On the whole, quantities going into processing continue an upward trend. The pack of frozen vegetables continues to increase. Total consumption is increasing for almost all vegetables but there is some evidence of a decline in fresh consumption.

There has been a 37 per cent increase in frozen vegetable consumption since the 1962-66 period and this likely accounts for part of the drop in consumption of some fresh vegetables and those otherwise processed.

Most demand factors for fresh and processed vegetables are positive although there seems to be some weakening in exports. Much will depend on general economic trends. With a continuation of high consumer disposable incomes, increasing at rates faster than population, the present strong demand will continue.

Under these circumstances, fresh salad vegetables, frozen vegetables, and other variety and convenience foods will be in greater demand as cultural and processing techniques improve during the next 10 years. As incomes increase and tastes become more discriminatory, demand will slowly increase for naturally-ripened vegetables, such as greenhouse tomatoes. Already there is a noticeable increase in demand for greenhouse lettuce, radishes and green onions during the winter and early spring.

Other factors, such as the irrigated areas of Saskatchewan and Alberta, varieties better adaptable to Canadian growing conditions, mechanical harvesting and centrally-organized marketing, will increase production and distribution and help Canada become more competitive in the domestic and export markets.

Projections indicate an increase of 12 per cent in fresh vegetable consumption by 1980 (4). Some of this demand will be met by imports.

THE PROCESSING INDUSTRY

The processing arm of the horticultural industry is an important outlet for fruit and vegetable production. The latest data indicate that processors contributed some \$200 million, in terms of value added, to national income. Processors perform an important service by transforming seasonal produce into an even year-round flow of products, thus reducing our heavy dependence on imports. Yet, to a large extent, processing has been looked upon as an adjunct to, rather than as an integral part of horticulture. If horticulture is to continue as a significant part of the economy, the relationship between the producer and the processor must be more of a partnership.

By 1980, our population will exceed 26 million with almost a 50 per cent increase in the number of households. During the next 10 years, about three-quarters of our population will be located in some type of city complex. By 1980, many more women—married or single—will be in the labor force most of their adult life. Disposable income is expected to double by 1980. These factors will cause radical changes in our present distribution pattern. One of the most substantial changes relates to the institutional market. It has been estimated that, in 1969, one in four meals was consumed away from home. By 1975, the ratio should increase to one in three. By the end of the next decade, it is expected that institutional sales volume will equal retail volume. Accompanying this will be a marked increase in demand for convenience foods. It is estimated that per capita consumption of processed fruit will increase 15 per cent and processed vegetables, 22 per cent by 1980, based on the 1964-66 average (4).

Every encouragement should be given, therefore, to see that the processing sector remains viable and that Canadian producers have this alternative means of extending the seasonal market for their produce. After all, this increase in demand can be met by imports.

CONCLUSION

Dramatic change has characterized world horticultural production and marketing during the past decade. The sixties witnessed a rapid sequence of innovations in production and marketing technology and by far the most important outcome has been a new era of world competition.

During the early part of the past decade, Canadian exports of horticultural produce increased to near pre-war levels for some products and surpassed them for others. A number of countries, however, began an expansion of horticultural production which was assisted by various market-protection devices and production aids. As a result, our export markets, and indeed our home markets, have been penetrated and, in some cases, practically taken over by exporters from such countries as Australia, South Africa, Greece and Turkey. Particularly important has been the impact of French apple production on Western European and United Kingdom markets, and the impact of Portuguese and Mexican tomatoes and tomato products on the Canadian market. Another example is the switch from United States to Taiwan as a source of mushrooms products in Canada.

Increasing productivity combined with a larger population and higher per capita disposable income portends bright prospects for the horticulture industry, but tariff walls and other protective devices will not preserve the home market much longer. The battle for horticultural markets during the seventies will

be fought and won by keeping one step ahead of competition.

NOTES AND REFERENCES

- (1) Furniss, I. F., "The Importance of Agriculture to the Canadian Economy", *Canadian Farm Economics*, Volume 4, No. 4, October 1969, Economics Branch, Canada Department of Agriculture.
- (2) Purnell, G. R., A. B. Andarawewa and R. A. Stutt, "Expected Patterns and Practices in Agriculture in 1980", *Canadian Farm Economics*, Volume 4, No. 3, August 1969, Economics Branch, Canada Department of Agriculture.
- (3) "Fruit, Vegetables, Honey and Maple Products", *Canadian Agricultural Outlook Conference*, Volume 1, Economics Branch, Canada Department of Agriculture, November 1969.
- (4) *Demand-Supply Projections for Canadian Agriculture—1980*, Economics Branch, Canada Department of Agriculture, June 1968, and unpublished data of the Economics Branch.
- (5) Burns, J. R. et al., *The Canadian Fruit and Vegetable Industry*, Special Report prepared for the Federal Task Force on Agriculture, June 1969.
- (6) Unpublished data of the Economics Branch, Canada Department of Agriculture.

CHILDREN, SCHOOLS AND THE WORLD FOOD PROGRAM

Frank Shefrin¹

There are more than 300 million children who, for lack of sufficient calories and proteins, suffer grossly retarded physical growth and development, and for many of these, mental development, learning and behaviour may be impaired as well. Furthermore, accumulated scientific evidence indicates that any amount of nutrients provided at a later date, for example, during the school-age period, cannot make up for malnutrition suffered during the pre-school period. Thus, despite the progress already achieved in increasing food production, the world community continues to face the problem of improving the diet of millions of children suffering from malnutrition(1).

In many countries, energetic attempts to reduce malnutrition, especially that affecting young children, through school feeding projects are already underway. School feeding is useful not only for the improvement of health, nutrition and the promotion of good dietary habits, but also for enrolment, school attendance, advancement and achievement.

It is in the poorest countries that educational facilities are generally most limited. Estimates made by various agencies indicate that only about half of the total number of the world's school-age children are in school. Food aid to schools and training centres can improve proficiency and regularity of attendance, reduce the drop-out rate, and increase the range of candidates for entry. It can be of great help to governments in carrying out literacy projects, particularly in providing additional compensation for the staff, or canteen meals for workers attending evening classes after a day's work. When applied to vocational training, food aid enables many developing countries to continue to provide such training for youth coming from the poorest groups.

The efforts to raise nutritional and educational levels, however, need to be intensified both by national governments and by outside agencies. External food aid makes it easier for governments of developing countries to initiate programs for the prevention and correction of malnutrition, especially in pre-school and school-age groups. Internationally, such special feeding activities have been undertaken by the World Food Program (WFP), the United Nations International Children's Emer-

gency Fund (UNICEF) and the United Nations Relief and Works Agency (UNWRA — Palestinian refugee assistance), bilateral arrangements between governments, the various religious institutions, and non-governmental organizations. WFP activities in this area are beginning to constitute an important proportion of the total food aid activity with respect to direct feeding of children.

How serious is the situation, and how are countries meeting this problem? Let us take, for example, the case of *Colombia*. Every day, 250 children under five years of age die in Colombia, more than a hundred of them as a result of malnutrition. The rate is 13 times higher than in the developed countries. The mortality rate among children under five years of age in France represents only 3.99 per cent of total deaths. In Colombia, the proportion is 50.3 per cent, that is 90,000 children a year. Here 65 per cent of the children under school age suffer from malnutrition, 5 per cent of them to the third degree. As many as 97 per cent of the children admitted to hospital show signs of malnutrition. In the kindergartens, the proportion is 85 per cent.

The Government of Colombia has launched a massive program of mother and child care to try to reduce the high rate of mortality and ill health which is prevalent among young children and pregnant and nursing mothers as a result of malnutrition. The project is being supported by the World Food Program with food aid worth more than \$42 million over a five-year period. Almost 5 per cent of the total population of Colombia will be receiving supplementary food through the project.

Another example is *Turkey*. On the basis of the results of research carried out by the World Health Organization (WHO) in 1956, the Government of Turkey, with the assistance of UNICEF, started, in the primary schools, a school feeding and nutrition education program. Since 1959, food aid has been provided by a bilateral food aid organization. In 1968, Turkey requested WFP assistance for the purpose of enlarging this type of program in school boarding institutions, including primary schools, teacher-training schools, secondary schools, technical schools for men and women, and tourism and commercial schools. The savings, estimated at \$18 million, which will occur to the Government of Turkey because of WFP assistance for a three-year period are being allocated as follows:

(a) up to 40 per cent for nutrition improvement;

¹ Director, International Liaison Service, Canada Department of Agriculture, and Chairman, Canadian Interdepartmental World Food Program Committee.

- (b) at least 60 per cent for the construction of new boarding schools according to annual programs that are being prepared in consultation with WFP.

The food being provided by WFP includes wheat, dried skim milk, canned cheese, bulgar wheat, edible oil, canned meat and tea. The local food that will be consumed in addition to WFP food includes fruit and vegetables bought in the local market.

A survey carried out by a WHO consultant in *Chad* revealed serious signs of malnutrition among infants, particularly during the weaning period. This led to a WFP project. The purpose of this project is to educate mothers in infant feeding and to teach them how to prepare a more balanced diet for pre-school children. In order to make this education more attractive and more effective, mothers receive food aid for the preparation of their own and their infants' meals. It is hoped that the mothers who have received this nutrition training will profit from it and pass it on to others. Infant mortality is expected to decrease as a consequence. The food for mothers includes wheat flour, dried eggs, vegetable oil, canned fish, and sugar; and for children, wheat flour, dried skim milk, vegetable oil, dried fruit, canned fish, and sugar. In both instances, WFP aid is intended to supply a supplementary diet. The food is being distributed to mothers and infants as cooked meals in demonstration courses, through the social centres; and as cooked meals, through the day nurseries' canteens, to the pre-school children.

In view of the limited nature of educational facilities in *Afghanistan*, the national "five-year plans" include the development and expansion of education at all levels. In order to make higher education available to those from areas where there are as yet no high schools, the Government provided new boarding facilities for students in Kabul, and extended those already existing. Among the institutions included in the improved boarding facilities program of the Government are a teacher-training academy, a technology institute, a polytechnic, a mechanics school and the Kabul University. The purpose of the WFP-aided project is, by relieving the Ministry of Education's yearly budget from some of the expenditure on food for the boarding schools and the University hostel, to enable the Government to maintain and increase the number of student places in these schools and in the University hostel. At the same time, WFP supplies contribute to providing a more balanced diet for the students. The commodities provided by WFP are used by the boarding school and dormitory kitchens in the preparation of the three daily meals served to the students. The improved diet resulting

from the inclusion of basic components supplied by WFP is complemented by locally procured foodstuffs, such as rice, fresh meat, vegetables, fruit and seasonings.

AN INTERNATIONAL SCHOOL FEEDING PROGRAM

Today the World Food Program is the major United Nations agency involved in providing food aid for assistance in nutrition, education and health programs.

The objectives of the World Food Program, as outlined in the rules and regulations, are to provide aid for:

- "(a) meeting emergency food needs and emergencies inherent in chronic malnutrition;
- (b) implementing projects, using food as an aid to economic and social development, particularly when related to pre-school and school feeding, increasing agricultural productivity, labour-intensive projects and rural welfare."

Since all WFP projects are, in a sense, feeding projects, WFP adopted the term "human resource development projects" to distinguish between these projects and those for the development of economic and social infrastructure or for those of a more directly productive nature. For the purpose of this article, however, the terms "special feeding projects" and "human resource development projects" are used interchangeably to cover the same group of projects.

In this article, the category, "special feeding projects," refers to projects in which food aid is used for the improvement of nutrition, and for nutrition education of vulnerable groups (such as pregnant and nursing women, infants, pre-school children, primary school children and hospital patients); for the rehabilitation of specific groups of patients; and for educational and training projects (secondary schools, universities, technical and vocational schools, youth camps, farmer-training camps, etc.), through the direct feeding of beneficiaries not immediately or primarily engaged in productive occupations, with a view to developing human resources in the assisted countries.

WFP food aid for the group defined as "vulnerable", is mainly in the form of milk powder. School feeding for primary and secondary schools is usually in the form of cooked meals which are made up of WFP commodities mixed with locally supplied foodstuffs. Similarly, in the case of professional and vocational training institu-

tions, food aid is mainly in the form of meals. This group is distinguished from the school feeding group, because the beneficiaries are being directly trained in productive skills, and either might be expected to engage in productive occupations within the near future, or are already so engaged as a corollary aspect of training.

The role of the World Food Program has, since mid-1968, expanded considerably in the field of special feeding projects (Tables 1 to 4). From the inception of the Program in January 1963 to mid-October 1969, of the 308 development projects approved, 81, or 26 per cent of the total, (compared with 24 per cent at the end of 1967) were for

TABLE 1—WORLD FOOD PROGRAM: NUMBER AND COSTS OF PROJECTS FOR THE DEVELOPMENT OF HUMAN RESOURCES BY CATEGORY OF PROJECT

	Projects		WFP Costs ^a	
	number	per cent	total	per cent
			million U.S. dollars	
All WFP projects ^b	308	100.0	792.6	100.0
Special feeding projects.....	81	26.3	255.8	32.3
Special feeding projects.....	81	100.0	255.8	100.0
Mothers and pre-school children.....	9	11.1	19.2	7.5
Elementary and secondary schools.....	29	35.8	170.4	66.6
Pre-vocational and vocational institutions.....	21	25.9	37.9	14.8
Universities, professional and technical institutes.....	15	18.5	21.0	8.2
Literacy and adult education campaigns.....	3	3.7	4.4	1.7
Hospital patients and convalescents.....	4	5.0	2.9	1.2

^a Includes costs of food and transportation.

^b Projects approved as of October 17, 1969.

TABLE 2—NUMBER OF WFP PROJECTS FOR THE DEVELOPMENT OF HUMAN RESOURCES BY CATEGORY AND REGION

	REGION I		REGION II		REGION III		REGION IV		REGION V		TOTAL	
	Latin America and the Caribbean		North Africa and Near East		West Africa		Mediterranean Europe and East Africa		Asia			
	number	per cent	number	per cent	number	per cent	number	per cent	number	per cent	number	per cent
All WFP projects ^a	48	100	73	100	55	100	42	100	90	100	308	100
Special feeding projects.....	17	35	18	24	27	49	8	19	11	12	81	26
Special feeding projects.....	17	100	18	100	27	100	8	100	11	100	81	100
Mothers and pre-school children.....	4	24	—	—	3	11	—	—	2	18	9	11
Elementary and secondary schools.....	6	35	7	39	11	40	3	38	2	18	29	36
Pre-vocational and vocational institutions.....	5	29	6	33	5	19	4	50	1	9	21	26
Universities, professional and technical institutes.....	1	6	3	17	5	19	1	12	5	46	15	18
Literacy and adult education campaigns.....	1	6	—	—	2	7	—	—	—	—	3	4
Hospital patients and convalescents.....	—	—	2	11	1	4	—	—	1	9	4	5

— = nil.

^a Projects approved as of October 17, 1969.

the development of human resources. In terms of costs of food and transportation, the total cost to WFP amounted to US\$256 million or 32 per cent (compared with 22 per cent at the end of 1967) of the total commitments for all approved WFP projects. The bulk of these projects are for feeding in elementary and secondary schools (29), and in professional and vocational institutes and training centres (36). There are few projects covering beneficiaries in the vulnerable groups, including hospital patients. Similarly, the number of youth-training projects is small.

The average size of special feeding projects has risen rapidly, from a total WFP cost per project of \$1.2 million at the end of June 1968 to \$3.2 million by mid-October 1969.

The total number of beneficiaries in these special feeding projects has also risen markedly, and now involves 4.2 million persons (or about 5 million including dependents of beneficiaries). The main benefi-

ciaries of WFP assistance through these projects are primary school pupils (54 per cent). Pre-school children account for 17 per cent and trainees in technical and vocational institutes, for 10 per cent of the total number of beneficiaries respectively. The Latin America and Caribbean, and the North Africa and Near East regions have the largest number of beneficiaries because of the large number of pupils receiving WFP assistance at primary and secondary schools.

Table 5 provides in summary form a brief description, by country, of every WFP project in the category of human development or special feeding. It indicates the variety of activities, the geographic coverage and the beneficiaries. In dollar value or in terms of the number of beneficiaries, WFP activity is only scratching at the surface of the problems of malnutrition. However, by assisting in the feeding of these groups, it would appear that WFP aid is beginning to serve more directly as a driving force, encouraging the national authorities to assume in-

TABLE 3—TOTAL WFP COSTS OF PROJECTS FOR THE DEVELOPMENT OF HUMAN RESOURCES BY CATEGORY AND REGION

	REGION I		REGION II		REGION III		REGION IV		REGION V		TOTAL	
	Latin America and the Caribbean		North Africa and Near East		West Africa		Mediterranean Europe and East Africa		Asia			
	thousand U.S. dollars	per cent	thousand U.S. dollars	per cent	thousand U.S. dollars	per cent	thousand U.S. dollars	per cent	thousand U.S. dollars	per cent	thousand U.S. dollars	per cent
All WFP projects ^a	101,626	100	310,894	100	80,842	100	82,823	100	216,403	100	792,588	100
Special feeding projects	67,896	67	73,518	24	49,865	62	41,588	50	22,831	11	255,698	32
Special feeding projects	67,896	100	73,518	100	49,865	100	41,588	100	22,831	100	255,698	100
Mothers and pre-school children	10,000	15	—	—	1,358	3	—	—	7,794	34	19,152	7
Elementary and secondary schools	51,033	75	61,641	84	38,002	76	10,244	25	9,461	41	170,381	67
Pre-vocational and vocational institutions	4,111	6	8,857	12	2,425	5	22,385	54	128	1	37,906	15
Universities, professional and technical institutes	1,087	2	1,892	3	4,869	10	8,959	21	4,234	19	21,041	8
Literacy and adult education campaigns	1,665	2	—	—	2,692	5	—	—	—	—	4,357	2
Hospital patients and convalescents	—	—	1,128	1	519	1	—	—	1,214	5	2,861	1

— = nil.

^a Projects approved as of October 17, 1969.

TABLE 4—DISTRIBUTION OF BENEFICIARIES IN WFP PROJECTS^a FOR THE DEVELOPMENT OF HUMAN RESOURCES BY CATEGORY AND REGION

Type of Beneficiaries	REGION I		REGION II		REGION III		REGION IV		REGION V		TOTAL	
	Latin America and the Caribbean		North Africa and Near East		West Africa		Mediterranean Europe and East Africa		Asia			
	number	per cent	number	per cent	number	per cent	number	per cent	number	per cent	number	per cent
Total beneficiaries.....	1,616,897	100	1,084,028	100	813,360	100	319,277	100	351,750	100	4,185,312	100
Expectant and nursing mothers.....	110,360	7	—	—	85,340	10	—	—	500	^b	196,200	5
Pre-school children.....	543,246	34	4,063	^b	117,855	15	—	—	54,540	16	719,704	17
Primary school pupils.....	737,074	46	851,840	79	243,600	30	178,775	56	250,000	71	2,261,289	54
Secondary school pupils.....	63,000	4	100,385	9	61,820	8	22,648	7	1,300	^b	249,153	6
University students.....	—	—	1,850	^b	2,600	^b	—	—	5,650	2	10,100	^b
Technical and vocational trainees.....	148,604	9	50,925	5	78,603	10	101,121	32	31,760	9	411,013	10
Participants at youth camps, boys' towns, farmers' training camps and rural centres.....	8,503	^b	69,125	6	101,122	12	14,850	4	—	—	193,600	5
Attendants at literacy classes.....	6,110	^b	1,590	^b	115,970	14	—	—	—	—	123,670	3
Hospital patients and convalescents	—	—	4,250	1	6,450	1	1,883	1	8,000	2	20,583	^b
Dependents, teachers, assistants, instructors, cooks and kitchen staff.	1,590		148,880		27,338		159,092		99,200		436,100	

— = nil.

^a Projects approved as of October 17, 1969.

^b Less than one per cent

creased responsibility for human development programs.

Subject to availability of resources, there are indications of a marked expansion in the number of human development projects. The World Food Program has currently before it (since November 1969) for consideration new requests for 24 special feeding projects from 18 countries. These projects include food aid for vulnerable groups including expectant and nursing mothers; kindergartens and orphanages; school feeding; vocational training centres; hospital patients; maternal and child health centres; and feeding of university students. The total costs to WFP, if all these projects are approved, will amount to US\$82 million. The foods that will be shipped if these projects are implemented include dried skim milk, wheat flour, canned cheese, canned meat, dried eggs, edible oil, sugar, canned and dried fish, pulses, maize flour,

coffee, bulgar wheat, ghee (butter oil) and dried fruit. It should be added that the food basket provided will vary from country to country, with from one commodity to a basket of six or seven commodities being shipped, depending on a country's requirements.

There are a number of reasons for this marked expansion in the number of requests for special feeding projects.

- (a) The expansion of special feeding projects is influenced by the willingness and the ability of recipient countries to undertake such projects. There is an increasing consciousness among governments in emergent countries of the need to improve their human resources as a means of stimulating long-term economic and social development, and as a consequence, a higher priority is being given to education and training.

- (b) Action taken by WFP and the United Nations agencies concerned to explore with developing countries their interest in special feeding projects.
- (c) Projects for human resources development are generally regarded as relatively easier to formulate and to put into operation than other categories of WFP projects, particularly when food aid is provided for existing institutions with adequate professional and administrative staff who can handle the details of preparation of projects and provision of the necessary data.
- (d) On the basis of experience to date, it would appear that the percentage of non-food costs of these projects borne by recipient countries of total cost of the project is generally below that for other categories of projects, and consequently, these are easier for governments to support.
- (e) In some countries in the Latin American and African regions, WFP assistance is expanding as other agencies reduce their activities in this sphere.
- (f) Food aid for human resource development covers an area of endeavour which conventional capital is reluctant to enter. The logical consequence of this has been an expansion of WFP aid in the direction of feeding programs.

Another reason is that a feature of special feeding projects is their ability to make good and extensive use of the two commodities, namely wheat and dairy products, which are in sizeable surplus at the present time, and which are expected to be so in the foreseeable future. Admittedly, an ideal ration for special feeding projects ought to have a wider composition than wheat and dairy products only, as indeed most of the current projects have now. Nevertheless, it should be noted that even if other matching foods were in short supply and only wheat and dairy products were available for large-scale feeding projects, these would still be beneficial to recipients. Although wheat and skim milk powder are more easily distributed to all types of projects, butter and butter oil are not as easily moved. The characteristics of these products are such that they could be handled most effectively through large-scale feeding projects.

EXPERIENCE TO DATE: PROGRESS AND PROBLEMS

What have been the experiences to date? How successful have special feeding projects been? What are some of the major problems? Under the regulations of the WFP, the Executive Director has to submit

progress reports and, at the completion of a project, an appraisal of the results to the governing body, the Intergovernmental Committee. Projects assisting education and training of various kinds have the dual purpose of increasing enrolment and attendance as well as improving nutrition and health standards. It has been asked, how effective is food aid in meeting real needs in this sector? The view has been expressed that WFP aid should only be granted after a thorough study of a country's priority needs in education and training, in order to ensure that the assisted institutions meet real needs and that there is assured subsequent employment of the trained personnel. Yet few developing countries have carried out manpower surveys that would determine priority areas. Therefore, the currently approved special feeding projects represent an *ad hoc* approach to meeting the demands for food aid for these types of projects. A wide scatter of projects has been developed ranging from those which serve a small number of beneficiaries as part of a larger, multipurpose project to those involving a significant sector of the population. A number of current WFP projects are assisting education and training in the rural sector where, in general terms, demand for trained manpower is greatest. Some are also assisting projects for the conversion of school curricula, with present emphasis on general education, into technical and rural education courses. The food aid provided in many of these cases is releasing budgetary savings for carrying out these reforms.

Although indications are that there are visible improvements in health and nutrition, there are technical problems that need to be solved. In one project in *Colombia*, a comprehensive evaluation of the nutritional impact of WFP aid was undertaken by the Colombia National Institute of Nutrition in collaboration with FAO and WHO experts. A decrease of about 70 per cent in the cases rated as third degree malnutrition had taken place as a result of WFP assistance. An important by-product of this project was a successful vaccination campaign. WFP aid was used as an incentive, as foodstuffs were provided only to those who held a vaccination certificate.

An evaluation of WFP assistance to educational and training projects in *Africa* has identified some major problems which tended to reduce the gains which food aid could assist in achieving in this sphere. These included the shortage of trained teachers and instructors; the need to develop an educational system appropriate to the needs of economic development; the lack of scope for effective absorption of students and trainees into the economy and, in particular, into the agricultural sector, at the end of their courses; and the need for adequate internal

finance and external aid to accelerate the changes that are sought in the educational system.

The aim of the WFP school feeding project in the *Sao Francisco Valley, Brazil*, is to help the Government to improve the health of the school children and to increase school enrolment and attendance in the whole area of the middle Sao Francisco Valley, which is semi-arid and which consequently, has very low agricultural production. Food is distributed free of charge to the school children in the form of a snack and lunch, provided daily during 240 school days a year. WFP food is supplementary to local food provided by the National School Feeding Campaign, such as sugar and spaghetti, and fresh vegetables and fruits from school gardens established in many primary schools where adequate facilities exist. Food is normally prepared in central kitchens in the project areas and distributed daily to the neighbouring schools, but when municipalities cannot provide central kitchens or canteens, the food is prepared and distributed in the schools. During a visit by a WFP headquarters officer, it was observed that many of the schools had little or no kitchen equipment and utensils; therefore, full distribution of the WFP ration was not possible. During field visits made by WFP officials, it was also ascertained that cooks and other administrative personnel responsible for the food distribution had little or no knowledge of nutritional requirements, preparation of balanced diets and the WFP-authorized ration scale.

The implementation of this Brazilian project during its first year deviated considerably from the plans envisaged in the agreement, and a much larger number of school children were assisted, but with a lower daily ration. These deviations were due to two main factors: (a) inadequate information from the Government regarding the actual number of schooldays per year, which were finally determined to be 150 and not 240, and the system of teaching one group of children in the morning and another in the afternoon; and (b) some lack of responsibility on the part of the local administration which (i) in a few cases, used WFP assistance as loans in areas other than those indicated in the agreement, (ii) did not anticipate the extent of difficulties in the provision of cooking facilities to such a great number of schools, and (iii) did not provide proper storage facilities in some districts. However, action was taken to readjust the plans, in the light of these circumstances, in order to utilize WFP assistance in the most effective way.

Experience to date indicates that while some WFP special feeding projects got off to a slow start, on the whole, there has been considerable improvement.

Beneficial effects have been substantial. However, more care will need to be given to planning projects in this field. As indicated in a WFP report on special feeding, WFP must have assurance that the project relates to the national development plans of the recipient country. The responsibilities and obligations of recipient countries need to be clearly identified with respect to supervision, facilities including services and equipment, supplementary food supplies, teachers, extension workers, teaching and health programs. Enough local support should be forthcoming in regard to the administrative, technical and financial requirements of a project to enable its successful implementation. The specialized UN agencies have provided technical scrutiny in the development of these projects. In some cases, they have provided experts and equipment for the execution of projects. However, there is scope for a more active role on the part of the United Nations agencies in the planning and implementation of special feeding projects. At the same time, the various non-governmental voluntary agencies can make a substantial contribution to the success of WFP human development projects by providing extension workers, home economists, and even such equipment as cooking utensils, stoves, etc. Experience to date gives an indication of the techniques required and the problems to be overcome in the management of special feeding projects (2).

CONCLUDING COMMENT

In view of the need and awareness to combat the high incidence of malnutrition among vulnerable groups and among children of school age, special feeding projects are receiving increasing attention from recipient and donor countries, and from international agencies. While it is recognized that special feeding projects, by themselves, will not solve either the nutritional or educational gap, they stimulate and assist national governments in assuming their responsibilities with respect to nutritional requirements, dietary practices, education and health.

NOTES AND REFERENCES

- (1) Much of the material appearing in this article is based on a special study prepared by the author for the World Food Program on the use of food aid for human development, and on other WFP reports. For details on the World Food Program and Canada's contribution to this multilateral food aid program, see Shefrin, F., "Canada and the World Food Program", *Canadian Farm Economics*, Volume 4, No. 6, February 1970.
- (2) Later in the year, a report dealing with the problems of management of food aid projects will be published in this publication.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
REGION 1: LATIN AMERICA AND CARIBBEAN			
FEEDING OF EXPECTANT AND NURSING MOTHERS AND PRE-SCHOOL CHILDREN			
<i>Colombia</i> Feeding program in the Department of Caldas	2,145	18	14,000 mothers; 36,000 pre-school children.
<i>Ecuador</i> ^c Promotion of community development and feeding of vulnerable groups among Andean Indians	596 ^d	12	Major part of project for 4,400 mothers; 9,200 pre-school children; 10,000 pupils in 200 schools; 5,775 leaders and auxiliary workers at 55 intensive courses at 3 centres.
<i>Mexico</i> Complementary rural feeding	5,096	36	150,000 pre-school children through 1,200 health centres.
<i>Peru</i> Food assistance to mothers and pre-school children	1,932	60	7,000 mothers and 18,000 pre-school children.
FEEDING IN ELEMENTARY AND SECONDARY SCHOOLS			
<i>Barbados</i> School lunch program	416	32	13,000 pupils at 51 primary schools
<i>Brazil</i> ^e School feeding in the Bon Jesus de Lapa district	484	10	17,000 primary pupils in 14 localities. Project merged with Brazil Project Number 339 in October 1967.
<i>Brazil</i> School feeding in the Sao Francisco Valley	5,260	36	167,000 pupils in 3,460 primary schools.
<i>Brazil</i> Feeding in secondary schools in Bahia	2,375	36	62,200 pupils in 29 secondary schools.
<i>Colombia</i> ^c Multipurpose development in Alta Guajira	162 ^d	36	Main part of project for 1,200 elementary and 800 secondary school pupils. Total WFP cost of project \$270,800.
<i>Colombia</i> Nutritional education and supplementary feeding of vulnerable groups	42,227	60	84,960 mothers, 330,046 pre-school children, and 526,220 primary school pupils, a total of 941,226 beneficiaries.
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING			
<i>Chile</i> Training centres for skilled laborers	1,117	60	22,000 trainees a year at 19 vocational training centres.
<i>Chile</i> ^c Community improvement in Arica	4.1 ^d	32	Part of project involves training in home economics and mothercraft for women at specially established centres. Total WFP cost of project \$370,000.
<i>Chile</i> Food aid to rural training centres	570	36	7,800 agricultural trainees at centres. Also 6,000 community leaders and 3,700 trainees attending short courses at special centres in agrarian reform, and 20 auxiliary and 30 administrative personnel.
<i>Colombia</i> Feeding in vocational training centres (SENA)	1,512	36	38,000 apprentices and adult trainees in 43 vocational training centres of the National Service of Apprenticeship.
<i>Jamaica</i> Training in, and construction of youth camps	609	14.5	1,578 youths in 3 camps.
<i>Trinidad and Tobago</i> Development of youth camps	304	60	Training in agriculture and trades for 1,000 youths.
FEEDING IN UNIVERSITIES, PROFESSIONAL AND TECHNICAL INSTITUTIONS			
<i>Bolivia</i> Food assistance for rural teachers' colleges	1,087	32	3,804 trainee teachers in 15 colleges and 2,654 primary school children in 8 rural practice schools.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
LITERACY AND ADULT EDUCATION CAMPAIGNS			
<i>Ecuador</i> Pilot project for functional literacy	1,665	48	Average of 6,110 participants in literacy centres; 310 instructors and their 1,240 dependents also receive rations.
REGION II: NORTH AFRICA AND NEAR EAST			
FEEDING OF EXPECTANT AND NURSING MOTHERS AND PRE-SCHOOL CHILDREN			
<i>Sudan</i> ^c Community development in the Khartoum and Managil areas	103 ^d	30	Part of project includes food for 1,350 pre-school children and 1,240 students at adult education classes.
FEEDING IN ELEMENTARY AND SECONDARY SCHOOLS			
<i>Algeria</i> Assistance to primary education	25,408	48	550,150 children in primary schools in 3 most needy departments of Constantine, Batna and Casis.
<i>Lebanon</i> Feeding program for children and youth	2,577	60	20,000 school children; 1,953 pre-school children and 1,185 youths and trainees. 2,871 personnel also receiving food.
<i>Morocco</i> School feeding	2,530	24	26,500 primary and 3,500 secondary school children at 108 day schools and 11 boarding schools in 7 districts, plus 3,400 trainee teachers.
<i>Morocco</i> Assistance to boarding schools	4,176	60	18,200 to 28,800 secondary school pupils.
<i>Sudan</i> Assistance to primary, secondary and vocational schools	23,887	60	208,500 elementary school pupils; 38,500 intermediate school pupils; 27,000 secondary school pupils; 15,000 vocational trainees and 4,000 teachers; a total of 293,000 beneficiaries.
<i>Tunisia</i> ^c Community development and institutional feeding for the economic and social development of Jendouba	1,300 ^d	36	Part of project provides food for 25,000 pupils in 95 primary schools; 1,200 pupils in secondary boarding schools; 660 trainees in 17 vocational training centres.
<i>Yemen</i> School feeding program	967	48	21,690 pupils at 33 primary schools; 1,170 students at 11 secondary schools and teacher-training institutes; 350 women attending literacy classes; 60 cooks and other personnel; 35 workers on government farms.
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING			
<i>Algeria</i> Education and training of war orphans	1,715	12	8,000 war orphans undergoing education and training in 55 homes at elementary and secondary levels, and trainees in shoemaking, carpentry, dressmaking and mechanics, as part of government plan for training of 30,000 war orphans.
<i>Iraq</i> Agricultural educational centres and social institutions.	835	48	1,500 orphans, old-age pensioners and children at reform schools and vocational training centres; 1,000 university agriculture and forestry students at Mosul; 195 trainees at Technical Agricultural Institute at Mosul; 850 agricultural students at University of Baghdad; 400 students at Technical Agricultural Institute at Baghdad; 280 students at Institute of Co-operatives in Baghdad.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING (continued)			
<i>Iraq</i> Assistance to vocational and teacher-training institutes	1,775	48	11,000 students at 21 vocational schools; 6,500 students at 28 teacher-training colleges; 850 girls at 16 home economics centres.
<i>Morocco</i> ^c Economic and rural development of the Western Rif. Region	38 ^d	48	Part of the project is for training of 4,440 girls for rural work; 840 agricul- tural extension workers and project managers, and 300 young farmers.
<i>Syria</i> Community development schemes and handicraft training centres	626	60	340 trainees per annum at 2 community development centres; 160 children in kindergarten; 140 women at 19 rural handicraft centres.
<i>Tunisia</i> Assistance to pre-vocational training and vocational training centres in boys' towns	3,297	24	5,865 students and 309 instructors in 123 pre-vocational centres; 2,390 stu- dents and 70 instructors in 45 vocational centres; 6,400 orphans and 480 instruc- tors in 27 boys' towns; 1,170 women and 30 instructors in 13 rural centres; 600 pre-school children and 45 instructors at 2 centres.
<i>Tunisia</i> Training of agricultural workers	610	24	17,500 workers per annum at 50 camps in groups of 50 workers per course; 70,000 dependents per annum also receiving food.
FEEDING IN UNIVERSITIES, PROFESSIONAL AND TECHNICAL INSTITUTIONS			
<i>Algeria</i> Assistance to teachers' colleges	596	48	4,500 students at 19 teacher-training colleges.
<i>Jordan</i> Improvement of nutrition in educational establishments	648	40	1,470 students at 6 teacher-training colleges; 510 students at agricultural schools; 550 at vocational schools; 215 at 12 secondary school hostels; also 2,000 boarders attending summer courses in nutrition and education.
<i>Tunisia</i> Agricultural education establishment project	648	24	4,550 agricultural trainees at 34 centres; 2,170 at 33 rural vocational centres.
FEEDING OF PATIENTS AND CONVALESCENTS			
<i>Southern Yemen</i> Assistance to hospitals and in-hospital training	616	60	1,110 leper hospital patients; 450 TB out-patients; 300 trainees and 150 nurses and other technical staff.
<i>Yemen</i> Assistance to hospitals and training centres for hospital staff	512	48	2,700 in-patients, 1,050 nurses and medical auxiliaries at 17 hospitals and 300 students at 3 training centres for hospital staff.
REGION III: WEST AFRICA			
FEEDING OF EXPECTANT AND NURSING MOTHERS AND PRE-SCHOOL CHILDREN			
<i>Central African Republic</i> Pre-school feeding	341	48	7,000 pre-school children.
<i>Chad</i> Nutrition education of mothers and pre-school feeding	326	60	24,750 mothers and 675 infants.
<i>Congo (Brazzaville)</i> Complementary feeding of mothers and pre-school children	692	60	1,590 mothers and 3,180 pre-school children at 14 mother and child welfare centres.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

	WFP Total Cost ^b	Project Time Period	
Country and Project Title	thousand U.S. dollars	months	Beneficiaries
FEEDING IN ELEMENTARY AND SECONDARY SCHOOLS			
<i>Botswana</i> Supplementary feeding program for school children, mothers and pre-school children	6,545	60	92,000 school children, students and trainees; 44,000 expectant and nursing mothers; 63,000 pre-school children and TB patients.
<i>Burundi</i> Secondary school feeding	3,255	60	17,000 boarders at 57 secondary schools.
<i>Congo (Brazzaville)</i> Secondary school feeding	880	60	3,520 students at 15 secondary boarding schools, 5 technical schools and 4 teacher-training colleges; 300 refugee children; 420 literacy instructors.
<i>Dahomey^c</i> Rural development	1,000 ^d	48	Part of project for 10,730 students in 29 "ruralized" and 24 other schools, 5 co-operative schools and a teacher-training college; 8,700 pupils at newly built schools; trainees at agricultural training centre.
<i>Gabon</i> Development of secondary and vocational education	723	60	2,000 boarders in 39 secondary schools and 1,500 boarders in 22 vocational schools.
<i>Ivory Coast</i> Secondary education development	3,871	60	20,000 secondary school pupils and 3,360 trainee teachers.
<i>Lesotho</i> Pre-school and school feeding	15,153	60	130,000 primary school pupils in 700 schools; 15,000 mothers, 30,000 pre-school children; 2,000 TB out-patients.
<i>Lesotho</i> Feeding of university students, boarding school pupils and hospital patients	1,249	36	4,460 secondary school pupils; 2,050 hospital patients; 970 trainee teachers and vocational trainees and 500 to 600 university students.
<i>Mauritania</i> School feeding	589	36	3,220 pupils at 11 to 15 secondary and vocational schools, 100 mothers at handicraft training centres and 150 pre-school children of trainees.
<i>Togo</i> School feeding	1,188	36	12,900 pupils at 46 primary schools; 135 trainee teachers and 172 cooks.
<i>Upper Volta</i> Secondary school feeding	1,691	48	8,420 boarders at 40 secondary schools.
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING			
<i>Central African Republic</i> Training of unemployed youth for rural development	657	48	8,100 youths at 54 clubs receiving courses in civics, literacy, agricultural practices and handicrafts; 1,875 club members at 25 co-operative villages who have received training for agricultural settlement; 600 youths at 8 camps trained in practical agricultural work; 40 participants at agricultural extension courses.
<i>Central African Republic^e</i> Rural development	400 ^d	48	Part of project for 14,400 farmers to be trained in handling draught cattle at one-month courses; 700 agricultural extension officers and 460 agricultural trainees at 2 agricultural schools. Extension workers and farmers also attending refresher courses; 100 rural craftsmen at training centres.
<i>Chad</i> Training of rural youth in rural development	218	60	2,250 government officials and students given courses on rural affairs at 45 centres; 2,400 trainees given courses in agricultural extension at 40 centres; 4,000 trainees given courses in poultry breeding, home economics, hygiene, handicrafts and literacy at 40 centres.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING (continued)			
<i>Congo (Brazzaville)</i> Training in agriculture and handicrafts Resettlement of urban unemployed youth	680	55	3,500 youths undergoing agricultural training and 200 youths at handicraft vocational training centres.
<i>Lesotho</i> ^c Institutional and livestock feeding	42 ^d	36	Part of project for feeding 120 students at Maseru Agricultural School; 240 farmers at 2 farmer-training centres and 180 students at 4 training farms.
<i>Senegal</i> ^c Expansion of rural employment through self-help activities	182 ^d	24	Part of project provides meals for 24,624 persons undergoing rural leadership training at 95 centres; 56,000 assistant rural leaders at 120 centres; 2,600 children in 22 village day nurseries and 700 youths at 4 agricultural centres.
<i>Togo</i> ^c Training of rural youth	194 ^d	36	Part of project for feeding 500 pioneer youths in 25 agricultural clubs and 100 school teachers attending agricultural training centres.
FEEDING IN UNIVERSITIES, PROFESSIONAL AND TECHNICAL INSTITUTIONS			
<i>Guinea</i> Feeding in technical schools	3,140	24	59,300 students in technical, vocational and agricultural schools.
<i>Liberia</i> Feeding of students and trainees	483	36	3,200 students and trainees at 34 intermediate and higher education institutions.
<i>Liberia</i> Feeding of university students, agricultural data collectors and forestry workers	307	36	Major part of project is to provide meals for 490 resident students and 510 non-resident students at the University of Liberia and Cuttington Agricultural College, and for 150 agricultural data collectors and their 600 dependents during training and field work. Remainder of project provides partial ration for forestry workers engaged in developing a forest estate for training purposes on the University of Liberia campus.
<i>Senegal</i> Technical education and rural vocational training	543	42	2,158 boarding pupils at 22 technical schools and 473 trainees in 10 rural vocational centres. Food assistance also provides for 1,296 dependents of trainees and for ex-trainees.
<i>Sierra Leone</i> Feeding in higher education institutions	396	60	1,000 university students, 200 trainee teachers and 400 trainees at 2 rural training institutes.
LITERACY AND ADULT EDUCATION CAMPAIGNS			
<i>Liberia</i> Functional literacy	770	36	5,000 adult participants and 10,000 pre-school children dependents; 50 instructors and their 200 dependents also receiving food aid.
<i>Mali</i> National literacy campaign	1,923	36	4,750 leaders in literacy courses; 110,000 participants and 19,000 dependents.
FEEDING OF PATIENTS AND CONVALESCENTS			
<i>Upper Volta</i> Feeding of hospital patients	519	48	Patients at 3 general hospitals with total of 1,520 beds, and sleeping sickness, TB and leprosy patients at 16 special hospitals with a total of 880 beds.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
REGION IV: MEDITERRANEAN EUROPE AND EAST AFRICA			
FEEDING IN ELEMENTARY AND SECONDARY SCHOOLS			
<i>Cyprus</i> Assistance to schools and hospitals	2,546	48	17,395 primary and 3,373 secondary school pupils at 238 schools; 1,340 pupils at 25 special schools for deaf and blind children, correction schools, youth centres and children's homes and 1,883 beds per year at 10 hospitals.
<i>Madagascar</i> Assistance for feeding of secondary and agricultural school pupils and trainees in rural self-help centres	2,133	60	9,175 pupils in 78 secondary schools, 900 teachers on refresher courses; 1,350 trainees at 20 agriculture schools and 440 trainees at 17 short-term courses per year.
<i>Mauritius</i> Primary school feeding	5,565	60	124,000 primary school pupils.
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING			
<i>Malawi</i> ^c Multipurpose development in rural areas	432 ^d	18	Part of project for 1,950 Malawi Young Pioneers at 16 training camps; 50 Malawi Young Pioneers to enable them to settle on 2,000 acres settlement area; 50 trainees at farm institutes; training of 2,000 farmers at 4 training centres (5-day courses); 815 extension workers and development staff per annum at Natural Resources Development Training Schools.
<i>Somalia</i> ^c Low-cost housing project	31 ^d	36	Part of project for 900 trainee masons, carpenters, blacksmiths, plumbers and their 3,600 dependents.
<i>Turkey</i> Farmer-training camps	4,081	24	7,500 farmer trainees at 75 camps plus their 36,000 dependents.
<i>Turkey</i> Establishment of a permanent labor force for forestry	17,230	24	500 workers being trained as forestry instructors; 5,000 workers receiving special training to become forestry foremen and 25,750 workers being trained to undertake forestry work. 125,000 dependents of trainees also receiving WFP rations.
<i>Zambia</i> National Youth Service	402	24	2,000 youths under training in 14 youth camps, including 7 agricultural training camps, 2 industrial skill camps and 4 girls' camps. 132 youths settled in 5 resettlement schemes.
<i>Zambia</i> ^c Training and resettlement of refugees	70 ^d	24	Part of project for training of 225 students at Nkumbi International College; 80 at Mkweshi Agricultural Training School and their 320 dependents.
FEEDING IN UNIVERSITIES, PROFESSIONAL AND TECHNICAL INSTITUTIONS			
<i>Turkey</i> Assistance to educational boarding institutions	8,959	36	49,222 trainee teachers at 85 schools; 4,110 pupils at 18 to 24 religious schools; 37,380 primary school pupils at 139 boarding schools, deaf and blind and orphan schools; 10,100 pupils at 75 secondary schools; 10,979 students at 39 technical schools; and 350 students at 2 tourism and commercial schools: a total of 112,641 trainees at 214 schools.

TABLE 5—SUMMARY OUTLINE OF WFP HUMAN RESOURCE DEVELOPMENT PROJECTS^a BY COUNTRY AND BY PROJECT (continued)

Country and Project Title	WFP Total Cost ^b	Project Time Period	Beneficiaries
	thousand U.S. dollars	months	
REGION V: ASIA			
FEEDING OF EXPECTANT AND NURSING MOTHERS AND PRE-SCHOOL CHILDREN			
<i>Taiwan</i> ^c	56 ^d	60	Major part of project for 53,440 pre-school children at 1,336 rural day-care centres. Also for 900 child-care workers, 180 administrators and 180 home economists during in-service training. Remainder of project for 16,800 qualified child-care workers and their 50,400 dependents in addition to salary and for 2,600 workers engaged in construction of 180 rural day-care centres and their 10,800 dependents.
Rural day-care centres			
<i>Taiwan</i>	274	60	500 mothers and 1,100 pre-school children at 19 welfare centres.
Nutrition improvement of self-supporting veterans' children and pregnant wives			
<i>Pakistan</i> ^c	480 ^d	30	Part of project. Toned milk distribution free to maternity homes, child welfare centres, poor homes and hospitals.
Karachi milk supply scheme			
FEEDING IN ELEMENTARY AND SECONDARY SCHOOLS			
<i>Afghanistan</i>	2,056	36	15,000 students and trainees in 48 boarding schools in 18 provinces, including 7 primary teachers' colleges, 11 emergency teacher-training schools; 10 vocational schools; 5 high schools for nomad boys, rural training institutes, 2 higher teacher-training colleges, 1 faculty of medicine and 2 tribal schools.
Food assistance to boarding schools outside Kabul			
<i>Taiwan</i>	7,405	12	250,000 pupils in 407 rural elementary schools.
Elementary school feeding			
FEEDING IN PRE-VOCATIONAL AND VOCATIONAL INSTITUTIONS, YOUTH CAMPS AND ON-THE-JOB TRAINING			
<i>Afghanistan</i>	129	36	1,000 orphans and physically handicapped persons undergoing training in tailoring, weaving, carpentry, shoemaking, etc.
Food assistance for vocational training and rehabilitation at Maraston Institute			
FEEDING IN UNIVERSITIES, PROFESSIONAL AND TECHNICAL INSTITUTIONS			
<i>Afghanistan</i>	2,209	24	1,500 students at University of Kabul and 10,000 students in 17 other institutions including 3 teacher-training colleges, 10 vocational training schools (including an agricultural school) and an institute of technology.
Food assistance to boarding schools and the University of Kabul			
<i>Afghanistan</i>	272	36	2,500 non-boarding university students.
Food assistance to University of Kabul			
<i>Malaysia</i>	985	60	4,500 residential students at Institute of Technology undertaking pre-university, professional and stenography courses.
Training for industrial and commercial employment			
<i>Philippines</i>	514	60	1,300 secondary students and 725 university students and graduates doing courses in agriculture, farm mechanics, etc.
Food assistance to Central Luzon State University, Munoz			
<i>Philippines</i>	254	12	925 university students.
Food assistance to Mindanao State University,			
FEEDING OF PATIENTS AND CONVALESCENTS			
<i>Pakistan</i>	1,214	60	8,000 hospital patients in 88 hospitals, dispensaries and child health centres, and their 32,000 dependents.
Railway hospital feeding, West Pakistan			

^a Projects approved as of October 17, 1969.

^b Includes cost of food and cost of transportation.

^c Only part of project relates to human resource development.

^d Apportioned cost of human resource development component.

^e Terminated project.

PROSPECTS FOR AN INTERNATIONAL AGREEMENT ON EDIBLE OILSEEDS, OILS AND FATS

J. S. Carmichael

A special meeting with representation from more than 60 countries including Canada was held in London, England, between January 26 and February 6, 1970, for the purpose of studying problems in the international trade of oilseeds, oils and fats, and making recommendations for both short-term and long-term intergovernmental arrangements to improve the market situation. This meeting was the fifth in a series. In 1966, the Committee on Commodity Problems of the Food and Agriculture Organization (FAO) decided to widen the scope of a group originally established to deal with coconut and coconut products. The new group was called the Study Group on Oilseeds, Oils and Fats. The purpose was to provide a forum for international consultations on all oilseeds, oils and fats, with special emphasis on problems of developing countries. Meetings were held in October 1966, September 1967, February 1968, and December 1968. Since the second meeting, the study group has been serviced by both the Food and Agriculture Organization and by the United Nations Conference on Trade and Development (UNCTAD). Arrangements in effect for various other commodities have been examined for applicability to the oils and fats situation.

There has existed, in recent years, a number of formal, long-term agreements involving the regulation of supplies and/or prices in which both producer and consumer interests have participated. These include agreements on wheat, coffee, tin, sugar and olive oil, and an agreement on cocoa is in prospect. The wheat agreements attempted to establish price ranges within which a minimum volume of trade was to take place between importing and exporting countries. The coffee agreement was designed to prevent the decline of prices below certain levels. The tin agreement aims at maintaining a price range through a buffer stock system, although changes in this range are not ruled out if world conditions indicate their desirability. The basic objective of sugar agreements has been to limit fluctuation of prices with the use of export quota controls. The olive oil agreement is not a price control agreement, but merely calls for consultation among exporters.

Short-term arrangements of a more informal nature have been worked out in connection with tea, jute and hard fibres. In 1969, 14 tea-producing countries made arrangements to take 90 million pounds of

black tea off the export market in 1970, in order to maintain prices. In the case of jute, the principal exporting country, Pakistan, has agreed to an "indicative price range" for a representative export grade of jute. In sisal and henequin, the mechanism used has been an informal export quota system. With tea, a consultative committee, and with jute and hard fibres, separate study group committees meet as often as three times a year, reporting to the Committee on Commodity Problems of the FAO.

Oilseeds, oilcakes, oils and fats, in terms of value, are the most important group of agricultural commodities in world trade. Virtually all countries are producers and consumers. However, developing countries producing tropical oils, including, in Africa, Nigeria, Senegal and the Ivory Coast, and in Asia, Malaysia, Indonesia, the Philippines and Ceylon, have been faced with a situation in production and trade which has become the focal issue of the Study Group.

Developing countries suggest that:

- (1) production of oils and fats in their countries has been increasing much more slowly than in developed or centrally planned countries;
- (2) per capita consumption in developed countries has remained low;
- (3) the developing countries' share of world trade has become smaller;
- (4) prices of oils in developing countries, particularly coconut and palm kernel oils, have been very unstable; and
- (5) within existing trading arrangements, there is little prospect for improvement and the situation might get worse.

Exports of coconut oil and palm oil by the main exporting countries increased by about 10 per cent between 1962-66 and 1968, and along with increased exports by smaller producers have resulted in increased world trade of about 20 per cent in each of these products (Table 1). Palm kernel oil exports have doubled and peanut oil exports have increased by more than 20 per cent. Copra exports by the Philippines declined by more than 20 per cent. This decrease and the reduction in palm oil exports by Nigeria, presumably related to the civil war in that country, were the major reductions in exports of tropical and semitropical oilseeds or their products from developing countries between 1962-66 and 1968.

Among temperate zone oils, soybean oil exports actually decreased by about 12 per cent between

TABLE 1—EXPORTS OF TROPICAL AND SEMITROPICAL OILS, PEANUTS AND COPRA, BY MAIN EXPORTING COUNTRIES, AVERAGE 1962-66 AND 1968

Origin	Coconut Oil		Palm Oil		Palm Kernel Oil		Peanut Oil		Peanuts		Copra	
	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968
	short tons ^a											
Philippines.....	250.3	297.4									971.9	731.9
Malay States.....	25.4	41.3	146.3	294.8								
Ceylon.....	103.2	70.7									52.8	23.9
Nigeria.....			150.6	3.8	8.3	30.1	91.1	122.1	888.3	1,021.8		
Congo.....			127.0	175.0	40.0	60.4						
Indonesia.....			142.4	154.1							140.3	170.9
Dahomey.....					6.3	23.2						
Senegal.....							141.3	218.3	381.5	383.2		
Argentina.....							60.9	61.7				
Zambia.....							10.5	23.6				
China (mainland).....							9.8	30.0				
Niger.....									49.6	100.0		
Sudan.....									158.7	260.1		
South Africa.....									200.8	175.4		
United States.....									74.2	108.1		
New Guinea.....									64.6	83.5	67.3	67.2
Mozambique.....											45.4	46.3

^a 2,000 pounds.

Source: *Foreign Agriculture Circular*, Fats, Oils and Oilseeds, October 1969, Foreign Agricultural Service, United States Department of Agriculture, Washington, D.C.

TABLE 2—EXPORTS OF REPRESENTATIVE TEMPERATE ZONE EDIBLE OILSEEDS, OILS AND FATS, BY MAIN EXPORTING COUNTRIES, AVERAGE 1962-66 AND 1968

Origin	Soybeans		Rapeseed		Sunflower Oil		Soybean Oil		Rapeseed Oil		Soybean Meal	
	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968	1962-66	1968
	thousand short tons ^a											
United States.....	6,124.9	8,834.3					586.5	476.4			15,855.5	21,626.0
China (mainland)....	532.8	682.5	7.5	9.7			3.0	4.4	8.2	15.9	2,907.9	2,771.2
Brazil.....	72.0	72.6									288.8	572.1
Canada.....	75.5	64.8	215.3	362.2			18.5	15.7	.1	—		
France.....			116.8	128.5					21.6	32.0		
Poland.....			38.1	193.3					7.3	77.2		
East Germany.....			3.1	59.7								
Sweden.....			41.0	63.8					16.0	27.9		
Netherlands.....			10.2	22.0					1.5	7.5		
U.S.S.R.....					266.3	786.7						
Romania.....					51.7	127.5						
Argentina.....					36.0	74.7						
Hungary.....					17.1	11.2						
Belgium-Luxembourg							4.9	23.3				
West Germany.....							7.8	22.5	19.3	69.7		
Denmark.....							43.7	48.1				
Japan.....									4.3	6.7		

— = none reported.

^a There are 2,000 pounds in a short ton.

Source: *Foreign Agriculture Circular*, Fats, Oils and Oilseeds, October 1969, Foreign Agricultural Service, United States Department of Agriculture, Washington, D.C.

1962-66 and 1968 (Table 2). This appears to reflect a change in location of processing facilities as soybean exports in the same period increased by 40 per cent. The quantity of oil exported in beans increased from almost 1.2 million tons to about 1.6 million tons. Total soybean oil (including oil in beans) in world trade was 2.2 million tons compared with 1.7 million tons of the 4 main tropical oils. Sunflowerseed oil exports increased in the period under consideration, from 1,011,000 tons to 379,000 tons. Rapeseed oil exports, while less significant in total, tripled and rape-

seed exports increased by more than 75 per cent in the period.

Exports of cottonseed oil, a product common to many developing as well as developed countries, fell very sharply in 1967 and 1968 with most of the reduction being from the United States.

Generally, the data bear out the contention of developing countries that they have not shared adequately in the increase in oilseed trade. Certain countries have been more seriously affected than others. Progress in finding possible solutions or areas of

agreement has been very slow. Prior to the most recent study group meeting, emphasis had been on possible long-range formal measures which might be taken. These included trade liberalization measures, internationally financed food aid, compensatory arrangements, buffer stocks and market studies. The objectives of these measures were expansion of market outlets, stabilization of prices, increasing consumption levels and higher productivity.

Trade liberalization measures considered included the removal of tariff barriers and of certain non-tariff barriers. Developing countries have claimed that developed countries have tended to maintain high tariffs on oils, so that developing countries are discouraged from crushing: they have pointed to subsidized production and subsidized exports of the European Economic Community and to the recent threat of the EEC to impose an "inland tax" on oilseeds and oils which they expect would further restrict trade.

Compensatory payment arrangements have been suggested repeatedly by developing countries. Such proposals could involve payments to developing countries when prices of their exports to developed countries fell below agreed reference prices. The effect of this scheme could be similar to the effect produced by the inland tax proposal, except that developing countries would not be disadvantaged.

Buffer stock, really a long-term and short-term scheme combined, has been proposed at several recent study meetings. The Ceylon delegation at the 1970 meeting proposed a scheme for stabilization of lauric oils, the major source of which is coconut oil. A buffer stock would be set up in each of the main exporting countries. Each exporting country would be allocated a supply "norm" based on each country's share of total exports: excesses over the "norm" in a given year would go into a buffer stock which could be used up in years when exportable supplies were below the "norm".

Internationally planned food aid, particularly by the World Food Program, has been advocated as a way of preventing surpluses. The suggestion was made at the recent conference that the World Food Program might use cash to buy substantial amounts of oils from developing countries. On the other hand, some developed countries argued that their donations to the World Food Program have been in kind, and that free cash, above transportation and administrative costs, has been quite limited. Another proposal made at the conference asked for the establishment of a separate "fund", to be contributed to by both developed and developing countries in proportions to be agreed upon. This "fund" could be used to stabilize prices by financing the removal of surpluses of any

oilseed; it could be used to finance, store and transfer surpluses into the World Food Program for food aid in developing countries; it could finance the collection of market intelligence and statistics; and it could be used to deal with various emergencies that might arise.

The emphasis of the recent London meeting was to concentrate less on long-term proposals and more on short-term informal proposals. Attention was drawn to the complexities and uncertainties arising from the number of inter-related products, and to the short-term imbalances in production which have been reflected in short-term price fluctuations for certain products.

Periodic short supplies of lauric oils are a cause of concern because they encourage development in the use of synthetic substitutes. A continuous appraisal of the many factors which affect the use of oilseeds, oils and meals, such as changes in livestock production and utilization for food, would be helpful.

Developed countries particularly pointed out the need for better statistical data from all countries concerned, so that the short-term situation could be understood well enough to indicate needed action. Such data would indicate availabilities and disposals, prices received and other data on an annual basis. In addition, short-term forecasts on an individual country basis would be essential, and such forecasts would indicate trends in national policies. The need was stressed for information from all countries. At present, data from at least one major supplier is lacking and without complete data, appraisals can not be adequately made.

The Study Group felt that, with improved information, specific short-term action could be considered from time to time. Various measures could be adopted such as temporarily withholding supplies or making varying use of food aid disposal.

The main decisions at the recent conference were:

- (1) to set up a Statistical Sub-Committee to collect and analyze statistics and make evaluations of the current and prospective market situation for oilseeds, oils, fats and meals. This sub-committee should meet as soon as practicable;
- (2) to recommend that the name of the Study Group be changed to "Intergovernmental Consultative Committee on Oilseeds, Oils and Fats" and that, on the basis of review of the statistical data to be provided from time to time, the Committee should identify specific problems calling for short-term action, and make recommendations for co-ordination of internal measures already taken or for additional informal short-term measures which might be taken;

- (3) to recommend that the parent bodies in FAO and UNCTAD consider changing the status of the Intergovernmental Committee to a joint FAO-UNCTAD Consultative Committee on Oilseeds, Oils and Fats.

PROBLEMS IN OBTAINING AN INTERNATIONAL AGREEMENT FOR OILSEEDS, OILS AND FATS

- (1) There are a large number of competing oils and fats for human use and meals for animal feed. They come from temperate and tropical zones and from vegetable, animal and marine sources. In other international agreements, there are basically only one or two products involved.
- (2) Most oils and fats are at least partially substitutable. Because of recent developments in eliminating taste, odor and other deficiencies, many are almost completely substitutable. At the same time, different characteristics make the prices of many oils quite sharply different from each other, and the relationship is continually changing.
- (3) The price of any single oil cannot be considered by itself, so establishing formal or informal price ranges is extremely difficult.
- (4) Because of the high degree of substitutability between oils and oil products, the establishment of market shares would be extremely difficult.

- (5) Unknown policies of major producers in Eastern European countries make market sharing or any kind of informal pricing mechanism virtually impossible, except perhaps for some individual product such as coconuts where a real substitute is lacking.
- (6) Varying oil content between oilseeds and varying demand for oils and meals add to the difficulties of arriving at any more or less permanent price relationship between oils, between meals and between oils and meals.
- (7) With such a large number of oils and fats, efficiency in production varies widely. In a competitive economy, some oils will, no doubt, be unable to hold markets.

The recent London meeting pointed out the great conflicts of interest between various countries. It also indicated the multitude of problems in the way of any meaningful progress toward an international agreement or toward any substantial improvement in marketing or markets which is of particularly serious consequence to developing countries. The establishment of a forum for discussion of these problems is helpful and better information is likely to be forthcoming. The identification of problems and the exchange of ideas could lead to limited improvements, such as could result from the Ceylon proposal for stabilization of the oil with perhaps the lowest substitution possibilities. It appears that, although no major agreement is likely within the next few years, Canada will need to participate in international meetings, both to assist with advice and suggestions and to combat any poorly-conceived market proposals.

CHANGES IN PRODUCERS' SHIPMENTS OF MANUFACTURING MILK AND CREAM UNDER THE OPERATION OF THE CANADIAN DAIRY COMMISSION

W. Y. Yang

The Government of Canada has adopted measures to improve the income levels of dairy (cream or manufacturing milk) producers by supporting the market prices of butter, skim milk powder and cheese, and by paying subsidies to producers. Since the proclamation of the Agricultural Stabilization Act in 1958, the support of both butter and cheese prices has been mandatory at levels not less than 80 per cent of the average price during the preceding 10 years. Annual adjustments have been made in the levels of price support and in the rates of subsidy payment to promote exports and encourage domestic consumption.

In 1965, the concept of sub-marginal producers was officially recognized (1) and no subsidy payment was made to shippers of less than 10,000 pounds of milk. Meanwhile, subsidies to producers who shipped more than 10,000 pounds of milk were made at a rate of 26 cents per 100 pounds for the first 48,000 pounds, 20 cents for the next 48,000 pounds and 10 cents for deliveries above 96,000 pounds of milk. Thus, the effect of the volume of business on production efficiency was acknowledged.

The Canadian Dairy Commission (CDC) was established in 1966 and went into full operation early in 1967. Measures adopted by the Commission were, on the whole, the same as those used by the Agricultural Stabilization Board in the previous years, but more emphasis was given to the rational development of the industry. Apart from supporting the income levels of dairy producers, the desirability of regulating the volume of shipment and the importance of efficient units of production were also emphasized. Producers of manufacturing milk and cream who made deliveries of less than 50,000 pounds of milk (or 1,750 pounds of butterfat) in 1966-67 were given an open quota of 50,000 pounds of milk for the fiscal year 1967-68 to encourage the development of economic production units (2). Larger producers were allotted quotas to the extent of their deliveries in the preceding year.

In early 1968, an application form was mailed to the quota holders of 50,000 pounds of milk or milk equivalent in 1967-68 to renew their quota entitlement for 1968-69 (3). Producers who had quotas larger than 50,000 pounds of milk in 1967-68 were automatically given the same quotas in the following year. Those producers who shipped less than 12,000 pounds in 1967-68, thus losing their quota entitlement, received a phasing-out payment in 1968-69.

Producers who shipped no cream or milk in 1967-68, together with those who failed to re-apply, lost their quota entitlement in 1968-69. Newcomers who started shipping manufacturing milk or cream in 1967-68 and registered with the Commission were given a quota if they shipped more than 420 pounds of butterfat in 1967-68. The initial quotas for this group were limited to their 1967-68 deliveries up to a maximum of 10,500 pounds of butterfat (300,000 pounds of milk). Early in 1968, the Commission declared that quotas would not be provided to new entrants after April 1, 1968 unless the herds were purchased from existing quota holders.

This article is intended to examine changes in the number of producers and in the quantity of cream and milk shipped during the last two years, 1967-68 and 1968-69, under the operation of the Canadian Dairy Commission. It is not the intention of this paper to offer suggestions for changes, but periodic reviews of this kind are essential for policy making (4).

NUMBER OF PRODUCERS

The number of manufacturing milk and cream shippers in Canada was 165,000 in 1966-67 (Table 1). The number decreased by more than 9 per cent to less than 150,000 in 1967-68 and by almost 13 per cent to about 130,000 in 1968-69. During the two-year period 1967-69, the number of manufacturing milk and cream shippers in Canada declined by 21 per cent.

In all provinces, the rates of decrease in the number of producers were considerably greater from 1967-68 to 1968-69 than from 1966-67 to 1967-68. The greatest rates of decrease from 1967-68 to 1968-69 occurred in British Columbia (25 per cent), Nova Scotia (20 per cent), and New Brunswick and Saskatchewan (17 per cent). The smallest decreases took place in Quebec (9 per cent) and Ontario (12 per cent). From 1966-67 to 1967-68, the largest decreases were registered in New Brunswick, Nova Scotia, Ontario and Manitoba, about 11 to 12 per cent, while the smallest decreases took place in British Columbia and Quebec, about 7 per cent, and in Alberta and Prince Edward Island, about 9 to 10 per cent.

In 1968-69, Quebec had 35 per cent of the shippers of cream and manufacturing milk under the Canadian Dairy Commission's subsidization program; Ontario had 22 per cent; the Prairie Provinces had 9 to 15 per cent each; the Maritime provinces, 1 to 2

TABLE 1—NUMBER OF PRODUCERS SHIPPING MANUFACTURING MILK AND CREAM, IN CANADA, BY PROVINCE, 1966-67, 1967-68, AND 1968-69

	Number of Producers			Percentage of Producers by Province ^a			Changes in Number of Producers			
	1966-67	1967-68	1968-69	1966-67	1967-68	1968-69	1966-67 to 1967-68		1967-68 to 1968-69	
							number	per cent	number	per cent
Manufacturing Milk										
Canada.....	68,577	65,189	60,614	100.0	100.0	100.0	-3,388	-4.94	-4,575	-7.02
P.E.I.....	1,008	948	818	1.5	1.4	1.4	-60	-5.95	-130	-13.71
N.S.....	201	182	151	.3	.3	.2	-19	-9.45	-31	-17.03
N.B.....	429	385	325	.6	.6	.5	-44	-10.26	-60	-15.58
Que.....	41,761	40,618	38,160	60.9	62.3	63.0	-1,143	-2.74	-2,458	-6.05
Ont.....	22,206	20,066	18,457	32.4	30.8	30.4	-2,140	-9.64	-1,609	-8.02
Man.....	716	830	813	1.0	1.3	1.3	+114	+15.92	-17	-2.05
Sask.....	12	25	22	—	—	—	+13	+108.33	-3	-12.00
Alta.....	1,950	1,839	1,651	2.8	2.8	2.7	-111	-5.69	-188	-10.22
B.C.....	294	296	217	.4	.4	.4	+2	.68	-79	-26.69
Cream										
Canada.....	103,527	88,894	73,006	100.0	100.0	100.0	-14,633	-14.13	-15,888	-17.87
P.E.I.....	3,043	2,690	2,325	2.9	3.0	3.2	-353	-11.60	-365	-13.57
N.S.....	2,350	2,084	1,676	2.3	2.3	2.3	-266	-11.32	-408	-19.58
N.B.....	2,847	2,502	2,074	2.8	2.8	2.8	-345	-12.12	-428	-20.64
Que.....	16,572	12,053	9,216	16.0	13.6	12.6	-4,519	-27.27	-2,837	-23.54
Ont.....	15,455	12,954	10,449	14.9	14.6	14.3	-2,501	-16.18	-2,505	-19.34
Man.....	15,803	13,903	11,636	15.3	15.6	15.9	-1,900	-12.02	-2,267	-16.30
Sask.....	23,453	20,968	17,332	22.6	23.6	23.7	-2,485	-10.60	-3,646	-17.39
Alta.....	23,390	21,185	17,881	22.6	23.8	24.5	-2,205	-9.43	-3,304	-15.60
B.C.....	614	555	417	.6	.6	.6	-59	-9.61	-138	-24.86
Total Producers^b										
Canada.....	165,061	149,457	130,464	100.0	100.0	100.0	-15,604	-9.45	-18,993	-12.71
P.E.I.....	3,868	3,490	3,050	2.3	2.3	2.3	-378	-9.77	-440	-12.61
N.S.....	2,503	2,212	1,779	1.5	1.5	1.4	-291	-11.63	-433	-19.58
N.B.....	3,214	2,836	2,345	2.0	1.9	1.8	-378	-11.76	-491	-17.31
Que.....	53,342	49,660	45,420	32.3	33.2	34.8	-3,682	-6.90	-4,240	-8.54
Ont.....	36,515	32,208	28,260	22.1	21.6	21.7	-4,307	-11.80	-3,948	-12.26
Man.....	16,333	14,474	12,301	9.9	9.7	9.4	-1,857	-11.37	-2,175	-15.02
Sask.....	23,459	20,979	17,351	14.2	14.0	13.3	-2,480	-10.57	-3,628	-17.29
Alta.....	24,940	22,767	19,339	15.1	15.2	14.8	-2,173	-8.71	-3,428	-15.06
B.C.....	887	829	619	.5	.6	.5	-58	-6.54	-210	-25.33

— = less than .05 per cent.

^a Components do not necessarily sum to totals because of rounding.

^b Some producers shipped both manufacturing milk and cream.

per cent each; and British Columbia had 0.5 per cent (5).

Quebec was the only province with a higher proportion of producers in 1968-69 (35 per cent) than in 1966-67 (32 per cent). The relative proportions of producers from all other provinces either remained unchanged as in the case of Prince Edward Island or decreased slightly.

In 1966-67, there were 68,600 producers in Canada who shipped their produce in the form of milk (manufacturing) and 103,500 producers who shipped it in the form of cream. Thus, prior to the CDC's operation, manufacturing milk shippers represented 41.5 per cent and cream shippers, 62.7 per cent of all dairy producers in Canada, excluding fluid milk shippers. About 7,000 producers, or 4.2 per cent of all producers, shipped both milk and cream in 1966-67.

The number of producers who shipped manufacturing milk decreased by 5 per cent from 1966-67 to

1967-68, and by 7 per cent from 1967-68 to 1968-69: the number who shipped cream decreased by 14 per cent to 1967-68 and 18 per cent to 1968-69. Because of the greater rates of decrease in the number of cream shippers, their proportions decreased to less than 60 per cent of total producers in 1967-68 and further to 56 per cent in 1968-69. On the other hand, the proportions of milk shippers increased to 44 per cent in 1967-68 and to 46 per cent in 1968-69. Similarly, the number of producers who shipped both milk and cream decreased by 34 per cent, from 7,000 in 1966-67 to 4,600 in 1967-68, and by 32 per cent, to only 3,000 in 1968-69. The proportion of producers who shipped both cream and milk represented only 2.4 per cent of the total number of dairy producers in 1968-69.

More than 90 per cent of the producers who shipped manufacturing milk came from two provinces, Quebec, with 61 per cent in 1966-67, 62 per cent

in 1967-68, and 63 per cent in 1968-69, and Ontario, with 32 per cent, 31 per cent and 30 per cent in the three respective years. Alberta had less than 3 per cent of the milk shippers in Canada, and Manitoba and Prince Edward Island each contributed only about 1 per cent.

From 1966-67 to 1967-68, the number of milk shippers decreased in all provinces other than Manitoba, Saskatchewan and British Columbia. From 1967-68 to 1968-69, the number decreased in all provinces, with the largest decreases in British Columbia (27 per cent), Nova Scotia (17 per cent), and New Brunswick (16 per cent). The smallest decreases in the number of milk shippers occurred in Manitoba (2 per cent), in Quebec (6 per cent), and in Ontario (8 per cent).

More than 60 per cent of all cream shippers in Canada were located in the three Prairie Provinces, and about 30 per cent in the two provinces, Quebec and Ontario. The number of cream shippers in all provinces decreased in both years. During 1968-69,

the decrease was almost 25 per cent from the preceding year in British Columbia and Quebec, and about 20 per cent in New Brunswick, Nova Scotia and Ontario. The smallest decrease occurred in Prince Edward Island, but it was still considerable at 14 per cent.

QUANTITY SHIPPED

Total Shippers

The quantity of butterfat, in the form of cream and manufacturing milk, shipped by producers in Canada decreased by 1.6 per cent, from 345 million pounds of butterfat in 1966-67 to less than 340 million pounds in 1967-68 (Table 2). From 1967-68 to 1968-69, the quantity shipped increased by more than 2 per cent to approximately 347 million pounds. Thus, in the first year of the CDC's operation, both the number of shippers and the quantity of cream and manufactur-

TABLE 2—QUANTITY OF BUTTERFAT SHIPPED IN THE FORM OF MANUFACTURING MILK AND CREAM, CANADA, BY PROVINCE, 1966-67, 1967-68 AND 1968-69

	Quantity of Butterfat Shipped ^a			Percentage Shipped by Province ^a			Percentage Change in Quantity Shipped	
	1966-67	1967-68	1968-69	1966-67	1967-68	1968-69	1966-67 to 1967-68	1967-68 to 1968-69
thousand pounds								
Manufacturing Milk								
Canada.....	232,581	244,047	259,010	100.0	100.0	100.0	+ 4.93	+ 6.13
P.E.I.....	1,812	1,968	1,993	.8	.8	.8	+ 8.61	+ 1.27
N.S.....	349	381	364	.3	.2	.1	+ 9.17	- 4.46
N.B.....	787	839	815	.3	.3	.3	+ 6.61	- 2.86
Que.....	121,673	132,709	144,872	52.3	54.4	55.9	+ 9.07	+ 9.17
Ont.....	99,153	97,332	99,116	42.6	39.9	38.3	- 1.84	+ 1.83
Man.....	1,237	2,220	3,050	.5	.9	1.2	+ 79.47	+37.39
Sask.....	20	42	56	—	—	—	+113.64	+32.39
Alta.....	6,685	7,638	7,857	2.9	3.1	3.0	+ 14.26	+ 2.87
B.C.....	865	918	888	.4	.4	.3	+ 6.13	- 3.27
Cream								
Canada.....	112,505	95,463	87,738	100.0	100.0	100.0	-15.15	- 8.09
P.E.I.....	3,879	3,600	3,531	3.4	3.8	4.0	- 7.19	- 1.92
N.S.....	1,672	1,462	1,253	1.5	1.5	1.4	-12.56	-14.30
N.B.....	3,332	3,021	2,718	3.0	3.2	3.1	- 9.33	-10.03
Que.....	22,704	16,576	14,083	20.2	17.4	16.0	-26.99	-15.04
Ont.....	24,020	20,427	18,407	21.4	21.4	21.0	-14.96	- 9.89
Man.....	15,030	13,095	12,401	13.4	13.7	14.1	-12.87	- 5.30
Sask.....	15,600	13,558	12,982	13.9	14.2	14.8	-13.09	- 4.25
Alta.....	25,794	23,347	22,033	22.9	24.5	25.1	- 9.49	- 5.63
B.C.....	473	377	332	.4	.4	.4	-20.30	-11.94
Total Butterfat								
Canada.....	345,094	339,511	346,748	100.0	100.0	100.0	- 1.62	+ 2.13
P.E.I.....	5,691	5,568	5,522	1.6	1.6	1.6	- 2.16	- .83
N.S.....	2,021	1,843	1,618	.6	.5	.5	- 8.81	-12.21
N.B.....	4,120	3,860	3,533	1.2	1.1	1.0	- 6.31	- 8.47
Que.....	144,377	149,285	158,955	41.8	44.0	45.8	+ 3.40	+ 6.48
Ont.....	123,173	117,759	117,523	35.7	34.7	33.9	- 4.40	- .20
Man.....	16,267	15,315	15,451	4.7	4.5	4.5	- 5.85	+ .89
Sask.....	15,620	13,600	13,038	4.5	4.0	3.8	-12.93	- 4.13
Alta.....	32,487	30,985	29,890	9.4	9.1	8.6	- 4.62	- 3.53
B.C.....	1,338	1,296	1,220	.4	.4	.4	- 3.14	- 5.86

- = less than .05 per cent.

^a Components do not necessarily sum to totals because of rounding.

ing milk shipped in Canada decreased: the number of producers decreased more rapidly than the quantity produced. During the second year of its operation, the total shipments increased while the number of producers continued to decrease, at an accelerated rate. This implies that the average quantity of shipment per producer increased considerably during those two years.

Quebec is the only province which showed increases in its total shipment of cream and manufacturing milk in both years of the CDC's operation. Shipments in Manitoba decreased in 1967-68 but increased slightly in 1968-69. In all other provinces, shipments declined in both years. In Nova Scotia, New Brunswick, and British Columbia, the rate of decrease in shipments was greater in 1968-69 than in 1967-68, while in Prince Edward Island, Ontario, Saskatchewan, and Alberta, the rate was smaller in the latter year.

Quebec contributed 42 per cent of the Canadian shipment of cream and manufacturing milk in 1966-67 and 46 per cent in 1968-69. Ontario ranked second, contributing 36 per cent in 1966-67 and 34 per cent in 1968-69. Alberta ranked third, Manitoba fourth, and Saskatchewan fifth, shipping 8.6 per cent, 4.5 per cent and 3.8 per cent respectively in 1968-69. Prince Edward Island and New Brunswick each contributed slightly more than 1 per cent while the shares contributed by Nova Scotia and British Columbia amounted to less than one-half of 1 per cent each.

Shipment by Types

The quantity of butterfat shipped in the form of manufacturing milk in Canada increased from 233 million pounds of butterfat in 1966-67 to 244 million pounds in 1967-68 (an increase of about 5 per cent), and further to 259 million pounds in 1968-69 (an increase of 6 per cent). On the other hand, the total volume of shipments of cream decreased by 15 per cent from 112 million pounds of butterfat in 1966-67 to 95 million pounds in 1967-68, and by 8 per cent from 1967-68 to 88 million pounds in 1968-69.

During 1966-67, shipments of manufacturing milk represented 67 per cent of the total butterfat deliveries of both milk and cream in Canada. In 1967-68, this proportion increased to 72 per cent and further to 75 per cent in 1968-69. This indicates the decline in the relative importance of cream shipments—from 33 per cent of total butterfat shipments in 1966-67 to 28 per cent in 1967-68 and 25 per cent in 1968-69.

Shipments of manufacturing milk increased from 1966-67 to 1967-68 in all provinces except Ontario. From 1967-68 to 1968-69, the total quantity shipped increased in six of the nine provinces, including the

two major producing provinces, Quebec and Ontario. In three of the smallest producing provinces, Nova Scotia, New Brunswick and British Columbia, the volume of manufacturing milk shipments decreased slightly.

Quebec supplied 52 per cent of all shipments of manufacturing milk in Canada in 1966-67, and 54 per cent in 1967-68. In 1968-69, Quebec's contribution increased further to 56 per cent of the total manufacturing milk shipments. Ontario's share of the manufacturing milk shipments was 43 per cent in 1966-67, 40 per cent in 1967-68 and 38 per cent in 1968-69. Thus, the two provinces, Quebec and Ontario, supplied more than 94 per cent of all the manufacturing milk shipped in Canada in these three years.

With regard to the quantity of cream shipments, the Prairie Provinces' share increased continuously from 50 per cent in 1966-67 to 54 per cent in 1968-69. Alberta's share was almost half of the cream shipment in the Prairies. The two provinces, Quebec and Ontario, contributed 41 per cent of the cream shipment in Canada in 1966-67, 38 per cent in 1967-68 and 37 per cent in 1968-69. The other four provinces contributed less than 9 per cent of the cream shipment in Canada in each of the three years studied.

SIZE OF DELIVERIES BY INDIVIDUAL PRODUCERS

Average Shipment per Producer

The average shipment of manufacturing milk was, in most cases, about three times as large as the average shipment of cream (Table 3).

It can also be noted that the average shipment of milk per producer in all provinces increased in both 1967-68 and 1968-69 from the respective preceding years. The increase was 55 per cent in 1967-68 in Manitoba, and in 1968-69, 50 per cent in Saskatchewan and 40 per cent in Manitoba.

Taking the average shipment of manufacturing milk per shipper in Canada as 100, only the shipment per producer in Ontario and Alberta was higher than 100. For all three years studied, average milk shipment per producer in all other provinces was far below the national average. In the Maritime provinces and Saskatchewan, it was only 50 to 60 per cent of the national average. However, because the rates of increase in the average quantities of shipment in the small-shipment provinces were greater than in Ontario and Alberta, particularly in 1968-69, the relative levels of the average shipment by producers in all other provinces increased considerably.

Taking the average cream shipment per producer in Canada as 100, shipment in Ontario exceeded the

TABLE 3—QUANTITY OF BUTTERFAT SHIPPED, PER SHIPPER, IN THE FORM OF MANUFACTURING MILK AND CREAM, CANADA, BY PROVINCE, 1966-67, 1967-68 AND 1968-69

	Average Quantity of Butterfat Shipped per Shipper			Percentage Change in Average Quantity Shipped		Average Quantity per Shipper, by Province, as a percentage of National Average		
	1966-67	1967-68	1968-69	1966-67 to 1967-68	1967-68 to 1968-69	1966-67	1967-68	1968-69
	pounds							
Manufacturing Milk								
Canada.....	3,392	3,744	4,273	+10.4	+14.1	100.0	100.0	100.0
P. E. I.....	1,798	2,076	2,436	+15.5	+17.3	53.0	55.4	57.0
N.S.....	1,736	2,094	2,412	+20.6	+15.2	51.2	55.9	56.4
N.B.....	1,835	2,179	2,506	+18.7	+15.0	54.1	58.2	58.6
Que.....	2,914	3,267	3,796	+12.1	+16.2	85.9	87.3	88.8
Ont.....	4,465	4,851	5,370	+ 8.6	+10.7	131.6	129.6	125.7
Man.....	1,727	2,675	3,751	+54.9	+40.2	50.9	71.4	87.8
Sask.....	1,648	1,692	2,546	+ 2.7	+50.5	48.6	45.2	59.6
Alta.....	3,428	4,153	4,759	+21.1	+14.6	101.1	110.9	111.4
B.C.....	2,941	3,102	4,093	+ 5.5	+31.9	86.7	82.9	95.8
Cream								
Canada.....	1,087	1,074	1,202	- 1.2	+11.9	100.0	100.0	100.0
P.E.I.....	1,275	1,338	1,518	+ 4.9	+13.5	117.3	124.6	126.3
N.S.....	711	702	748	- 1.3	+ 6.6	65.4	65.4	62.2
N.B.....	1,170	1,208	1,311	+ 3.2	+ 8.5	107.6	112.5	109.1
Que.....	1,370	1,375	1,528	+ .4	+11.1	126.0	128.0	127.1
Ont.....	1,554	1,577	1,762	+ 1.5	+11.7	143.0	146.8	146.6
Man.....	951	942	1,066	- .9	+13.2	87.5	87.7	88.7
Sask.....	665	647	749	- 2.7	+15.8	61.2	60.2	62.3
Alta.....	1,103	1,102	1,232	- .1	+11.8	101.5	102.6	102.5
B.C.....	771	680	795	-11.8	+16.9	70.9	63.3	66.1
Total Butterfat*								
Canada.....	2,091	2,272	2,658	+ 8.7	+17.0	100.0	100.0	100.0
P.E.I.....	1,471	1,596	1,810	+ 8.5	+13.4	70.3	70.2	68.1
N.S.....	807	833	909	+ 3.2	+ 9.1	38.6	36.7	34.2
N.B.....	1,282	1,361	1,507	+ 6.2	+10.7	61.7	59.9	56.7
Que.....	2,707	3,006	3,500	+11.0	+16.4	129.5	132.3	131.7
Ont.....	3,373	3,656	4,159	+ 8.4	+13.8	161.3	160.9	156.5
Man.....	996	1,058	1,256	+ 6.2	+18.7	47.6	46.6	47.3
Sask.....	666	648	751	- 2.7	+15.9	31.9	28.5	28.3
Alta.....	1,303	1,361	1,546	+ 4.5	+13.6	62.3	59.9	58.2
B.C.....	1,508	1,563	1,971	+ 3.6	+26.1	72.1	68.8	74.2

* Some producers shipped both manufacturing milk and cream.

national level by more than 40 per cent; in Quebec and Prince Edward Island, by more than 25 per cent; in New Brunswick, by about 10 per cent; and in Alberta, by about 2 per cent. On the other hand, the average cream shipment per producer was about 60 to 70 per cent of the national level in Nova Scotia, Saskatchewan and British Columbia, and just less than 90 per cent in Manitoba.

Combining both milk and cream shippers, the relative size of dairy operation in each of the provinces can be compared. Ontario ranked first and Quebec second by shipping from about 3,000 to more than 4,000 pounds of butterfat per producer. In Prince Edward Island and British Columbia, producers shipped an average of about 2,000 pounds of butterfat in 1968-69. Producers in New Brunswick and Alberta shipped an average of about 1,500 pounds; in Manitoba, slightly more than 1,200 pounds; and in both Nova Scotia and Saskatchewan, less than 1,000 pounds.

With the exception of Saskatchewan in 1967-68, producers in all provinces shipped, on the average, more milk and cream in both 1967-68 and 1968-69 than the respective preceding years, and the rates of increase were considerably greater from 1967-68 to 1968-69 than from 1966-67 to 1967-68.

Variations in Size of Shipment per Producer

In 1966-67, there were 52,859 producers of manufacturing milk and cream in Canada who shipped less than 700 pounds of butterfat (20,000 pounds milk equivalent), and 32,935 producers who shipped between 700 and 1,400 pounds of butterfat (20,000 to 40,000 pounds milk equivalent). The number of shippers in each shipment class becomes fewer as the size of shipment increases (Table 4).

From 1966-67 to 1967-68, the number of producers in each of the shipment classes below 4,900 pounds of butterfat (140,000 pounds of milk) decreased consider-

TABLE 4—NUMBER OF PRODUCERS SHIPPING BUTTERFAT IN THE FORM OF MANUFACTURING MILK AND CREAM, ACCORDING TO SIZE OF SHIPMENT, CANADA, BY PROVINCE, 1966-67, 1967-68 AND 1968-69

Shipment Class in Pounds of Butterfat	Numbers of Producers			Percentage Change in Number of Producers		Percentage of Producers in each Shipment Class ^a		
	1966-67	1967-68	1968-69	1966-67 to 1967-68	1967-68 to 1968-69	1966-67	1967-68	1968-69
Manufacturing Milk								
Less than 700 pounds.....	9,437	6,970	4,898	-26.1	-29.7	13.8	10.7	8.1
700 to 1,399.....	8,252	7,124	5,374	-13.7	-24.6	12.0	10.9	8.9
1,400 to 2,099.....	8,582	7,881	6,369	- 8.2	-19.2	12.5	12.1	10.5
2,100 to 2,799.....	8,392	7,814	6,712	- 6.9	-14.1	12.3	12.0	11.1
2,800 to 3,499.....	7,329	7,075	6,455	- 3.4	- 8.8	10.7	10.8	10.6
3,500 to 4,199.....	5,956	5,796	5,624	- 2.7	- 3.0	8.7	8.9	9.3
4,200 to 4,899.....	4,733	4,777	4,730	+ .9	- 1.0	6.9	7.3	7.8
4,900 to 5,599.....	3,840	3,945	4,048	+ 2.7	+ 2.6	5.6	6.1	6.7
5,600 to 6,299.....	2,909	3,124	3,404	+ 7.4	+ 9.0	4.2	4.8	5.6
6,300 to 10,499.....	9,147	8,481	10,029	+16.8	+18.2	13.3	13.0	16.5
10,500 and more.....	2,202	2,971	2,971	+35.0	+35.0	3.4	4.9	4.9
Sub-total.....	68,577	65,189	60,614	- 4.9	- 7.0	100.0	100.0	100.0
Cream								
Less than 700 pounds.....	49,092	43,624	32,170	-11.1	-26.3	47.4	49.1	44.1
700 to 1,399.....	26,429	21,538	18,364	-18.5	-14.7	25.5	24.2	25.2
1,400 to 2,099.....	13,413	11,027	9,924	-17.8	-10.0	13.0	12.4	13.6
2,100 to 2,799.....	6,899	5,883	5,453	-14.7	- 7.3	6.6	6.6	7.5
2,800 to 3,499.....	3,652	3,152	3,033	-13.7	- 3.8	3.5	3.6	4.1
3,500 to 4,199.....	1,837	1,645	1,758	-10.4	+ 6.9	1.8	1.8	2.4
4,200 to 4,899.....	1,004	874	965	-13.0	+10.9	1.0	1.0	1.3
4,900 to 5,599.....	544	501	578	- 7.9	+15.4	.5	.6	.8
5,600 to 6,299.....	282	296	309	+ 5.0	+ 4.4	.3	.3	.4
6,300 to 10,499.....	375	328	421	- 5.6	+28.4	.4	.4	.6
10,500 and more.....	26	31	31	+19.2	+19.2	.4	.4	.4
Sub-total.....	103,527	88,894	73,006	-14.1	-17.9	100.0	100.0	100.0
Manufacturing Milk and Cream								
Less than 700 pounds.....	52,859	46,942	34,550	-11.2	-26.4	32.0	31.4	26.5
700 to 1,399.....	32,935	27,532	23,059	-16.4	-16.2	20.0	18.4	17.6
1,400 to 2,099.....	21,560	18,563	16,061	-13.9	-13.5	13.1	12.4	12.3
2,100 to 2,799.....	15,246	13,717	12,153	-10.0	-11.4	9.2	9.2	9.3
2,800 to 3,499.....	11,197	10,307	9,508	- 8.0	- 7.8	6.8	6.9	7.3
3,500 to 4,199.....	7,983	7,535	7,430	- 5.6	- 1.4	4.8	5.1	5.7
4,200 to 4,899.....	5,882	5,741	5,745	- 2.4	+ .1	3.6	3.8	4.4
4,900 to 5,599.....	4,489	4,509	4,681	+ .4	+ 3.8	2.7	3.0	3.6
5,600 to 6,299.....	3,261	3,466	3,742	+ 6.3	+ 8.0	2.0	2.3	2.9
6,300 to 10,499.....	9,649	8,902	10,519	+15.5	+18.2	5.8	6.0	8.1
10,500 and more.....	2,243	3,016	3,016	+34.5	+34.5	1.5	2.3	2.3
Total ^b	165,061	149,457	130,464	-9.4	-12.7	100.0	100.0	100.0

^a Components do not necessarily sum to totals because of rounding.

^b Some producers shipped both manufacturing milk and cream.

ably while the number of producers in all the shipment classes above 4,900 pounds of butterfat increased. During 1968-69, the number of producers in each shipment class below 4,200 pounds of butterfat decreased and the number increased from the preceding year in all classes above this quantity. The highest rate of decrease, 26 per cent, was in the number of producers who shipped less than 700 pounds of butterfat, while the highest rate of increase was in the number of producers who shipped more than 10,500 pounds of butterfat (300,000 pounds milk equivalent), notwithstanding the declared policy of limiting quota allocation to newcomers to less than 300,000 pounds of milk. Even with these rates of change, there are still more small producers than large producers.

On the other hand, the rates of increase or decrease

from one year to the next were considerably different between the numbers of cream and milk producers. The rates of decrease in the number of small milk producers and the rates of increase in the number of large milk producers were, on the whole, much more striking than the rates of decrease or increase in the number of cream producers.

There is a greater concentration of cream producers in the two smallest shipment classes. About 70 per cent of the cream producers shipped less than 1,400 pounds of butterfat each but only about 20 per cent of the manufacturing milk producers shipped this small a quantity. In 1968-69, about 44 per cent of the shippers, including those who shipped both milk and cream, shipped less than 1,400 pounds of butterfat.

TABLE 5—TOTAL QUANTITY OF BUTTERFAT SHIPPED IN THE FORM OF MANUFACTURING MILK AND CREAM ACCORDING TO SIZE OF SHIPMENT BY INDIVIDUAL PRODUCERS, CANADA, BY PROVINCE, 1966-67, 1967-68 AND 1968-69

Shipment Class in Pounds of Butterfat	Quantity of Butterfat Shipped ^a			Percentage Changes in Quantity Shipped		Percentage of Total Shipment ^a		
	1966-67	1967-68	1968-69	1966-67 to 1967-68	1967-68 to 1968-69	1966-67	1967-68	1968-69
thousand pounds								
Manufacturing Milk								
Less than 700 pounds.....	2,908	2,187	1,555	-24.8	-28.9	1.3	.9	.6
700 to 1,399.....	8,683	7,532	5,709	-13.3	-24.2	3.7	3.1	2.2
1,400 to 2,099.....	15,003	13,835	11,202	-7.8	-19.0	6.5	5.7	4.3
2,100 to 2,799.....	20,500	19,107	16,427	-6.8	-14.0	8.8	7.8	6.3
2,800 to 3,499.....	23,001	22,201	20,265	-3.5	-8.7	9.9	9.1	7.8
3,500 to 4,199.....	22,857	22,250	21,619	-2.7	-2.8	9.8	9.1	8.4
4,200 to 4,899.....	21,603	21,769	21,579	+ .8	-.9	9.3	8.9	8.3
4,900 to 5,599.....	20,004	20,559	21,093	+ 2.8	+ 2.6	8.6	8.4	8.2
5,600 to 6,299.....	17,269	18,538	20,214	+ 7.4	+ 9.0	7.4	7.6	7.8
6,300 to 10,499.....	80,752	67,003	79,842	+19.0	+19.2	34.7	27.5	30.8
10,500 and more.....	29,066	39,505	39,505	+35.9		11.9	15.3	
Sub-total.....	232,581	244,048	259,010	+ 4.9	+ 6.1	100.0	100.0	100.0
Cream								
Less than 700 pounds.....	15,879	13,492	10,085	-15.0	-25.2	14.1	14.1	11.5
700 to 1,399.....	26,703	21,725	18,570	-18.6	-14.5	23.7	22.8	21.2
1,400 to 2,099.....	22,966	18,895	17,042	-17.7	-9.8	20.4	19.8	19.4
2,100 to 2,799.....	16,670	14,193	13,133	-14.9	-7.5	14.8	14.9	15.0
2,800 to 3,499.....	11,353	9,817	9,453	-13.5	-3.7	10.1	10.3	10.8
3,500 to 4,199.....	7,007	6,277	6,706	-10.4	+ 6.8	6.2	6.6	7.6
4,200 to 4,899.....	4,549	3,984	4,374	-12.4	+ 9.8	4.1	4.2	5.0
4,900 to 5,599.....	2,799	2,579	2,980	-7.9	+15.6	2.5	2.7	3.4
5,600 to 6,299.....	1,676	1,750	1,834	- 4.4	+ 4.8	1.5	1.8	2.1
6,300 to 10,499.....	2,905	2,416	3,144	- 5.3	+30.1	2.6	2.5	3.6
10,500 and more.....	336	416	416	+23.8		.3	.4	
Sub-total.....	112,505	95,463	87,738	-15.2	- 8.1	100.0	100.0	100.0
Manufacturing Milk and Cream								
Less than 700 pounds.....	17,329	14,769	11,055	-14.8	-25.2	5.0	4.3	3.2
700 to 1,399.....	33,632	28,151	23,619	-16.3	-16.1	9.8	8.3	6.8
1,400 to 2,099.....	37,252	32,155	27,870	-13.7	-13.3	10.8	9.5	8.0
2,100 to 2,799.....	37,068	33,360	29,541	-10.0	-11.4	10.7	9.8	8.5
2,800 to 3,499.....	35,049	32,277	29,776	-7.9	-7.8	10.2	9.5	8.6
3,500 to 4,199.....	30,584	28,895	28,509	-5.5	- 1.3	8.9	8.5	8.2
4,200 to 4,899.....	26,802	26,163	26,183	- 2.4	-.1	7.7	7.8	7.6
4,900 to 5,599.....	23,351	23,466	24,360	+ .5	+ 3.8	6.8	6.9	7.0
5,600 to 6,299.....	19,357	20,561	22,226	+ 6.2	+ 8.1	5.6	6.1	6.4
6,300 to 10,499.....	84,672	70,130	83,528	+17.7	+19.1	24.5	20.6	24.1
10,500 and more.....	29,584	40,082	40,082	+35.5		8.7	11.6	
Total.....	345,094	339,511	346,748	- 1.6	+ 2.1	100.0	100.0	100.0

^a Components do not necessarily sum to totals because of rounding.

Quantity of Total Shipment from each Shipment Size Class

In 1966-67, the manufacturing milk and cream producers who shipped less than 1,400 pounds of butterfat each were 52 per cent of the producers in Canada, but they contributed only 15 per cent of the total quantity of all shipments (Table 5). In 1968-69, 44 per cent of the producers, that is, those who shipped less than 1,400 pounds of butterfat, contributed only 10 per cent of the total industrial milk and cream supplies in Canada. On the other hand, the 10 per cent of the shippers whose average shipment was more than 6,300 pounds of butterfat in 1968-69 contributed more than 35 per cent of the total supplies.

From 1967-68 to 1968-69, the quantity of butterfat shipped by both milk and cream producers shipping less than 700 pounds of butterfat decreased by 25 per cent while the quantity contributed by producers shipping between 6,300 and 10,500 pounds of butterfat increased by 19 per cent, and the amount from those shipping more than 10,500 pounds of butterfat increased by more than 35 per cent. This happened in spite of the quota limit of 10,500 pounds of butterfat (300,000 pounds of milk).

Thus, the government policy of improving production efficiency by encouraging larger production units had, in fact, proved successful but, at the same time, it resulted in higher total production.

SUMMARY AND CONCLUSIONS

Although the number of producers participating in the Canadian Dairy Commission's subsidization program decreased by 9 per cent from 1966-67 to 1967-68 and by 13 per cent from 1967-68 to 1968-69, total supplies of manufacturing milk and cream decreased by only 1.6 per cent in 1967-68 and increased by more than 2 per cent in 1968-69, from the respective preceding years.

Cream shippers represented 63 per cent and manufacturing milk shippers, 41 per cent of the total number of producers (165,061) participating in the subsidization program in 1966-67: 4 per cent of the total number of producers shipped both cream and milk. Because of the greater rates of decrease in the number of cream shippers, the proportion of cream shippers was reduced to 59 per cent in 1967-68 and to 56 per cent in 1968-69, while the proportion of milk shippers increased to 44 per cent in 1967-68 and to 46 per cent in 1968-69. In spite of these changes, there were still more cream producers than milk producers in 1968-69. However, the average shipment of butterfat per producer in the form of manufacturing milk was approximately three times as large as the average shipment in the form of cream.

More than 60 per cent of all manufacturing milk shippers in Canada were in Quebec and about 30 per cent in Ontario. More than 60 per cent of Canada's cream shippers were residing in the Prairie Provinces and about 30 per cent in the two provinces of Quebec and Ontario.

About 55 per cent of the total manufacturing milk shipped in Canada had its origin in Quebec and about 40 per cent in Ontario: 50 per cent of the cream supplies came from the Prairies, about 20 per cent from Ontario, and a little less than 20 per cent from Quebec.

Ontario had the highest average shipment of both manufacturing milk (5,370 pounds of butterfat) and cream (1,762 pounds of butterfat) in 1968-69. Alberta ranked second, and British Columbia, Quebec and Manitoba, third, and fourth and fifth in the average shipment of manufacturing milk per producer, while Quebec and Prince Edward Island ranked second and third in the average shipment per cream producer.

There was a much greater concentration of cream producers than manufacturing milk producers in the smallest shipment size classes. The rates of decrease in the number of producers in the smallest size classes as well as the rates of increase in the number of producers in the largest size classes, for both milk and cream, were much greater than those in the medium size classes. These rates of change were noticeably greater in the number of milk producers than in the number of cream producers.

The rates of change in the total quantity of milk and cream shipped by producers in the various size classes followed the same patterns as in the number of producers; that is, the more marked changes took place in both the largest and smallest size classes (in opposite directions) but changes in the quantity of cream shipments were much less phenomenal than in the milk shipments.

The Canadian Dairy Commission has achieved some success in reducing the number of producers of small quantities of manufacturing milk and cream, but the total supply of manufacturing milk continues to increase. A solution requires a co-ordinated effort by governments and private organizations.

NOTES AND REFERENCES

- (1) Clark, J. H., R. G. Marshall and B. B. Perkins, *Canadian Dairy Policies*, Queen's Printer, Ottawa, 1969.
- (2) Quotas are established on the basis of butterfat. The butterfat content of manufacturing milk is assumed to be 3.5 per cent. Therefore, a quota of 50,000 pounds of milk is actually a quota of 1,750 pounds of butterfat. This may be delivered either as milk for manufacturing or as cream.
- (3) Yang, W. Y., "Characteristics of Holders of Small Dairy Quotas, 1967-68", *Canadian Farm Economics*, Volume 4, No. 2, June 1969, Economics Branch, Canada Department of Agriculture, Ottawa.
- (4) This paper is based on data obtained from records of the Canadian Dairy Commission. Gratitude is due to Dr. H. J. Mestern, Economic Advisor of the Canadian Dairy Commission and Mrs. D. M. Forsyth, Programming Officer of the Data Processing Unit, Canada Department of Agriculture, for their permission to use the data.
- (5) In British Columbia, most milk producers operate within the provincial system of pooling fluid milk for marketing purposes. The number of manufacturing milk and cream producers enumerated in this paper (Table 1) represents only those producers outside the pool system, and comprises only a small proportion of the total milk producers. Therefore, the data for this small proportion of producers are not typical of dairy producers generally, in the province.

POLICY AND PROGRAM DEVELOPMENTS

Commercial Egg Marketing in Saskatchewan—The Saskatchewan Commercial Egg Producers' Marketing Board is authorized, by Order in Council, to regulate commercial egg marketing in interprovincial and export trade, in accordance with the Agricultural Products Marketing Act. (January 14, 1970)

Nova Scotia Crop Insurance—By an Agreement with Nova Scotia under the Crop Insurance Act, the Government of Canada will pay 25 per cent of the premiums and 50 per cent of the administrative costs of a crop insurance program in that province. Nova Scotia will pay 50 per cent of the administrative costs, but will make no contribution to the premiums. In 1969, Nova Scotia operated a crop insurance program for winter wheat and spring grains. In 1970, apple crops will also be insured. The effective date of the Agreement is April 1, 1969. (February 10, 1970)

Ontario Grape Growers' Marketing-For-Processing Order—The period during which the Ontario Grape Growers' Marketing Board was authorized (by Order in Council P.C. 1967-1237, June 22, 1967, as amended) to collect levies of \$5.00 per ton of grapes marketed has been extended to December 31, 1970. (February 10, 1970)

Ontario Tender Fruit Growers' Marketing-For-Processing Order—An amendment to Order in Council P.C. 1966-1201, June 30, 1966, as amended, extended the period during which the Ontario Tender Fruit Growers' Marketing Board may collect levies from December 31, 1969 to December 31, 1970. Levies are collected at the rate of \$4.00 per ton of Bartlett pears marketed, \$4.00 per ton of cherries, \$2.00 per ton of Kieffer pears, \$2.00 per ton of peaches and \$2.00 per ton of plums. (February 10, 1970)

Nova Scotia Hog Marketing Levies—The levies that may be collected by the Nova Scotia Hog Producers' Marketing Board, up to September 1, 1970, have been increased from 5 cents per hog marketed to not more than 10 cents per hog marketed, by an amend-

ment to Order in Council P.C. 1968-1328, July 17, 1968. (February 10, 1970)

Wheat Stock Reduction Program—Producers in the Wheat Board designated region who reduce wheat acreage below 1969 levels and who increase summer-fallow or perennial forage by the same amount will receive compensation payments of \$6.00 per acre for additions to summerfallow or \$10.00 per acre for additions to perennial forage acreage. Partial payments to producers will be made before the end of July 1970.

Total payments under the program will be available to a maximum of 22 million acres of additional summerfallow and 2 million acres of additional perennial forage. Individual producers will be eligible for compensation on a maximum of 1,000 acres; however, the eligible acreage per producer cannot exceed the amount of the producer's 1969 wheat acreage.

To receive the payment for perennial forage, a producer must have the land in perennial forage until it is inspected in the mid-summer of 1971.

The program is to be administered by the Canada Department of Agriculture.

Wheat delivery quotas for the 1970-71 crop year will be based on the total of: a) 25 per cent of summerfallow acreage as stated in the producer's 1969 permit book; b) total summerfallow acreage in 1970; and c) the amount by which perennial forage acreage in 1970 exceeds perennial forage acreage in 1969.

Wheat delivery quotas in 1970 will be 8 bushels per qualified acre, provided that the total qualified acreage does not exceed 53 million acres. If demand requires additional deliveries of durum or specific grades of wheat, special quotas could be opened on the basis of the qualified acreage for wheat quotas.

Quotas for oats, barley, soft spring wheat and other crops will be based on the acreage seeded to each crop in 1970. In addition, any producer may allocate any or all of his acres that qualify for a wheat quota to any other crops. (February 27, 1970)

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Federal Agricultural Legislation, Canada, 1969, R. M. Siddiqui, Economics Branch, Canada Department of Agriculture, Ottawa, October 1969, Pub. No. 69/19. pp. ii + 81.

This reference bulletin outlines the federal legislation pertaining to agriculture, as of August 1, 1969. It replaces *Federal Agricultural Legislation in Canada, 1954* and the supplements to it.

UNITED NATIONS PUBLICATIONS

Available in Canada from the Queen's Printer, Ottawa
Forests, Food and People, Basic Study No. 20, Henry Beresford-Peirse, Food and Agriculture Organization of the United Nations, Rome, 1968. pp. x + 72.

The maintenance of an ecologically sound balance between agriculture, pasture and forest land and the restoration of such a balance where it has been disturbed are two of the problems discussed in this publication. The study also explains how forests may be a source of food and a regulator of water supplies, and points out that indiscriminate forest destruction is correlated to decreasing agricultural productivity. The contributions to the national economy of forest industries and tourism are also discussed.

Toward a Strategy for Agricultural Development, Basic Study No. 21, Food and Agriculture Organization of the United Nations, Rome, 1969. pp. ix + 65.

As part of their Indicative World Plan for Agricultural Development and the Freedom From Hunger Campaign, the FAO selected five aspects of agricultural development that were felt to require detailed study. This publication describes these five studies under the headings: "High yielding varieties of basic food crops", "Filling the protein gap", "War on waste", "Mobilization of human resources for rural development", and "Earning and saving foreign exchange".

The studies present analyses of the problems and recommendations for solutions.

OTHER PUBLICATIONS

Not Available from the Economics Branch

Incorporating the Family Farm Business, A. R. Jones, Economics Division, Alberta Department of Agriculture, Edmonton, February 1970, Pub. No. 817.90. pp. 17.

This bulletin explains the concept of a corporation as it relates to a farm business and describes the advantages and disadvantages of incorporation with regard to farm business continuity, ownership trans-

fer, and income, estate and gift taxes. The costs of incorporation and the procedure to be followed are also discussed.

Future Market Outlets for Canadian Wheat and Other Grains, S. C. Hudson, Economic Council of Canada, Cat. No. EC22-2/11, Queen's Printer, Ottawa, 1970. pp. xxiv + 326. Price: \$3.00.

This is the report of a study of future export and domestic market outlets for wheat and other grains to provide an assessment of medium-term demand for Canadian grain exports. Although the main emphasis of the study is on wheat, there is also an analysis of market outlets for coarse grains and oilseeds. On the basis of his analysis, the author points out the policy implications of the study, particularly with respect to resource use in Western Canada, and makes recommendations for action by governments and producers. **Canadian Journal of Agricultural Economics**, Volume 17, No. 3, November 1969. Published three times a year by the Canadian Agricultural Economics Society. Copies available from the Society at Box 632, Postal Station B, Ottawa 4, Ontario, Canada. Single copies: \$3.50. Annual subscriptions: \$10.00.

Contents of the November 1969 issue include the following articles:

Economic Guidelines for Land and Water Resource Use in Agriculture

Economic Guidelines for Present and Future Capital Use in Canadian Agriculture

Economic Guidelines for Mobilizing Labour and Management in Canadian Agriculture

Symposium: Agricultural Policy in a Dynamic Economy

Guidelines for Agricultural Policy over the Next Decade

Obstacles Expected and Steps Required in Implementation of a Sound Policy for Canadian Agriculture

Prospects and Potentials in Canadian Beef Production

The Size and Structure of the Livestock Industry in Canada, 1980

Alternative Methods of Marketing Livestock

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The Demand for Agricultural Economists by Canadian Universities and Governments

Minimum Resource Requirements for Specified Resource Returns on Ontario Farms

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CANADIAN FARM ECONOMICS

SUPPLY MANAGEMENT — DEFINITION, TECHNIQUES AND IMPLICATIONS

G. A. Hiscocks

Agriculture has an affinity for cycles. In weather, there are cycles of wet and dry springs, often alternating with dry and wet summers. In livestock production, there are hog and cattle cycles with peaks and troughs of production. There are cycles in agricultural debates, discussions and philosophies too. In the last few years, production efficiency was emphasized but now the pendulum has swung to marketing. This new emphasis on marketing is justified by the need to pay more attention to market demand, market development and market organization. There is a real danger in allowing interest and involvement in marketing to swing from one side to another. In fact, one of the problems in agriculture is the lack of continuing concern with marketing. To some extent, at least, this cyclical nature of producer interest in marketing is a reason for the recurring concern for the possibilities and the problems of supply management. As emphasis shifts from supply to marketing, so does the interest in supply management.

A Definition of Supply Management

Supply management can be defined as the centralized control over the quantity and/or price of one or more commodities of specified quality, being produced or coming from a known group of producers to a particular market in a given period (*1*). Each producer exercises supply management when he decides how much to produce—how many acres, how many cows and so on. The crucial feature of supply management in the marketing context is the aspect of centralized control over a specific group of producers.

The Objective of Supply Management

The objective of supply management is to increase the per capita net incomes of farmers and/or to

stabilize prices, production and farm incomes. By manipulating the volume of production coming to market or by controlling the rate of delivery throughout the season, producer incomes will be higher than without this control. Alternatively, prices will be more stable, either seasonally or from year to year, than if no control had been exercised. In either case, the key feature is that the impact of this action is on all producers and that the results are aggregate results—at least for all producers within the group involved.

Some Aspects of Agricultural Supply and Demand

In order to appreciate the full meaning and application of supply management, the supply and demand features of agriculture should be understood. There are four particularly significant features on the supply side. First, for almost every agricultural commodity produced in Canada, there are a large number of producers. This has several important economic effects, but in relation to this topic, the result of a large number of producers of the same product is that the output of the average producer is so small relative to total output that it cannot by itself affect market prices. In most commodities, this is true for every producer, large or small, since very few producers are large enough to have an impact on the market with their output alone.

Secondly, decreases in farm prices cause only small declines in output. Because of the nature of farm production, with the importance of fixed costs and unavoidable overheads, prices must fall drastically before output is reduced. There may be shifts in production from one commodity to another but there will be only a very slow and small reduction in total agricultural production.

Thirdly, there have been rapid improvements in production technology and management, especially in the productivity per agricultural worker, which has increased faster than productivity in the economy as a whole. This means that if prices are unchanged, output rises because of this improved technology. Therefore, the impact of price reductions is even greater because output is, in fact, increasing.

Fourthly, there is an inherent instability of output in most commodities, regardless of price fluctuations. Many commodities are produced annually or within a narrow season. Others are easier or cheaper to produce in the summer than the winter. In addition, weather and disease cause annual, seasonal and even cyclical fluctuations in output.

Left on their own, these features of agricultural supply play havoc with farm and market prices, create marketing and storage problems and lead to great inequalities of income between producers. Combined with these supply problems are some special features of demand for agricultural products which are also important. There are at least five aspects of demand to consider.

First, most farm products have price inelasticity within Canada; that is, as the price decreases, the amount purchased increases by a smaller proportion than the price reductions. The result of this feature is that expenditures per capita for specific farm products tend to decrease when output is increased, which means that only the same or a smaller amount of money or income is available to producers although they produced more.

Secondly, as incomes rise, Canadian expenditure on food is increasing only very slightly; that is, most foods are income inelastic. There is, of course, a continuing shift to more expensive foods, such as meat, fruits and vegetables, and away from cereals and potatoes, to more highly processed and convenience foods and to more eating away from home. However, total consumption and total expenditure on food, especially at the farm level (before processing) will only increase as population increases.

Thirdly, on export markets, the volume and revenue of Canadian sales can be increased considerably by a small reduction in price, except in a few cases such as wheat, because Canadian exports are a small part of world trade, and a reduction in the price of exports by Canada is unlikely to cause similar price cutting in the market in the importing country.

Fourthly, export markets are subject to protection and to the competition from export-subsidized products. This question of access to markets on a competitive basis is crucial to a country like Canada

where from 20 to 30 per cent of farm products are exported.

Fifthly, and yet very important, in most markets, the price at which the last five per cent (or even one per cent) of the commodity can be sold determines the price received for the entire quantity. It is seldom possible, in most agricultural markets, to sell the usual volume at a good price and any excess cheaply: if excess is produced, all of the crop will receive a lower price.

It is very important to recognize that these supply and demand features are at play in the agricultural marketing scene and that supply management is one tool available to help overcome some of the problems created by these features. The objective of supply management is to stabilize prices and production and hence income, and, where possible, to raise income. The general procedure is through an orderly sharing, among all producers of a particular commodity or in a particular market, of the opportunity in that market, so that each producer benefits from the organized action. This does not always mean that every producer is better off. Frequently, there will be some producers with a preferred position but, in aggregate, the price and gross revenue will be higher. In the application of supply management, there are still some questions to be raised and some problems unsolved, but at least some of the difficulties are being tackled.

Techniques of Supply Management

Although the emphasis of supply management implementation tends to be centred on quotas, there are a number of other techniques which can be used either separately or in conjunction with quotas to control supply, production or marketing. The methods used depend on the problems at the particular time. Perhaps the best illustration of the versatility of the quota concept is the Government's "LIFT" program (3) for western wheat production where the delivery quota increases the less wheat a farmer grows.

A quota is a basis to allocate each producer a share of the market. The variations in quota allocation are thus dependent on the choice of criteria for a quota. These criteria could be related to at least three different features:

- a) production,
- b) sales or marketings, or
- c) inputs.

In Canada, control over production has been very limited because there are legal and political difficulties and because the concept has a general connotation that is contrary to our basic philosophy.

Although the aim of quota allocation is to get as close as possible to a marketing quota, establishing criteria other than a historical base leads in practice to the use of an input item to define the level of the quota. Thus such criteria as the number of square feet of housing (broilers), and the land area permitted to be sown (tobacco) or actually seeded (Canadian Wheat Board) are used to determine quotas. In dairy, the actual volume to be delivered is often stated, or the previous year's deliveries influence the present year's quota. A similar approach is used for potatoes in British Columbia.

It is important to differentiate between annual quotas designed to influence annual production and those quotas affecting the seasonal or orderly flow of deliveries to market or off farms. Such crops as wheat and potatoes and apples are good examples of crops with large year-to-year production fluctuations, largely outside the producers' control, and smaller annual and seasonal demand fluctuations. There is, therefore, an urgent need to ensure an orderly flow of these crops and to provide an equitable method of establishing this orderly flow. "Seeded acres", "specified acres" and, for this year, "summerfallow acreage plus perennial forage acreage" (4) are the criteria for western wheat quota allocations. The disadvantage is that the emphasis on land, on inputs, tends to de-emphasize yields and productivity. In the case of potatoes and apples, there is no national or regional procedure for marketing. British Columbia has systems for both crops, based largely on historical marketings. In other provinces, there are considerable "highs" and "lows" in prices according to how the marketings progress throughout each season, but, since these crops are not storable from year to year like wheat, the year-to-year fluctuation creates a different problem—thus, a different quota technique would be required.

The main concerns with the use of quotas are their allocation, ownership and, above all, their transferability. The practices of marketing boards vary greatly. Some allow the buying and selling of quotas freely on the market: some supervise this trade. Some marketing boards require that the sale of quotas include the sale of the input on which the quota is based (that is, cows, broiler houses, tobacco land etc.): others allow the sale of the right alone. This is a complex subject and one which can cause a great deal of controversy. There is one underlying theme in this whole area that is paramount. First, agriculture has its important features, even peculiarities, on the supply and the demand side. Secondly, supply management is a procedure that interferes with the free play of these features in the marketing system to derive benefit and improvement for

producers. The advantages of interfering with the free market system must be weighed against the disadvantages of doing nothing. This does not mean that any supply management technique is good—certainly the procedure must be chosen very carefully and having been chosen, must be evaluated periodically and perhaps changed to another procedure later on to avoid a build-up of harmful effects. But in trying to alleviate some of the harmful effects or results of the agricultural supply, demand, price and income problems through supply management, it must be recognized and accepted that there will be harmful effects in other directions. The hard work involves minimizing and not perpetuating these harmful effects.

Other techniques include the different uses of price in supply management. There are at least three different methods to consider:

- a) price negotiation or contracts,
- b) two-price systems, or
- c) price guarantees.

The negotiation of contract prices for production enables a relatively good price to be obtained, but the volume that a producer can sell depends on his ability to obtain a contract and the volume in it. The weakness of a contracting system without price negotiation, as occurs with many crops for processing, is that the producer has a very big risk with respect to both price and volume.

The two-price system restricts the supply going to the high-priced sector of the market and channels the remainder of production to other markets. There are many opportunities in this area if multi-pricing is included but, like other techniques, it has its dangers.

The whole process of price guarantees (for example, the initial price for western grains) is related to supply management with a view to stability of production. This is practiced much more widely in other countries where production subsidies are more important. One example is the wheat and feed grain programs in the United States, where diversion payments, allotment acreages and so forth are adjusted each year to try to tailor production to foreseeable demand. A similar feature is contained in the Canadian Dairy Commission's program, with a direct payment to producers of manufacturing milk and a heavy penalty for over-quota production.

The techniques of supply management are thus many and varied, but need to be chosen carefully in relation to the type of commodity, the production structure and marketing system in relation to price, and with particular regard to minimum interference in continuing improvements in production efficiency. In other words, the use of quotas and other mech-

anisms should not reduce the competitive efficiency of Canadian agriculture.

Obstacles and Limitations to Supply Management

In the broad aspect of supply management, there are some distinct limitations. To be effective, it is necessary to be able to control the production or marketings of a significant number of producers. With the exception of the special examples of western grains and manufacturing milk, the development and progress of supply management in Canadian agriculture has been on a provincial basis. Thus a limitation exists in the inability to organize nationally. Even if this inability is overcome, there are two other important limitations to supply management. The first is the limit to which it is practical to restrict supply and try to raise prices and the second is the influence of imports.

The case of imports is simply an extension of the control aspect. Provincial control is insufficient and the pressure is for regional or national control and then for international control. The international aspects usually take the form of a request for import restriction and control. The other approach would be to aim at international supply management. The basic ideas behind international commodity agreements include this principle, and there are grains, coffee, sugar, cocoa, and olive oil agreements in existence. However, the degree of international co-operation has not yet developed sufficiently to provide an international legal authority with enough power to enforce supply management, but this is one of the directions in which to aim in this complex international area.

The reverse side of the impact of imports can be linked closely with the other limitation—the practical limit to raising prices through restriction of supply. For two important reasons, society will not benefit from considerably higher prices for agricultural products: (i) the higher cost to consumers, and (ii) the creation of a less efficient and less competitive agriculture. In terms of price levels, one needs to distinguish between a small and a large increase and between reducing price fluctuations and large price increases. It is difficult to be precise in this area because it is an area of consumer and political reaction, but it is a realistic situation which agricultural producers and policy makers must consider. One answer to this question is to allow imports to continue to flow in and to compete with Canadian products. This means that national supply management can be organized and developed but must always be ready to compete with the imported prod-

uct. This does not mean that domestic producers would have to compete with distress-priced imports but, in many commodities, there are regularly imported supplies as well as domestic supplies. Specific cases have to be judged on their merits, but this principle is one that is acceptable to those concerned with consumers' interests.

Legal Problems

The background and history of marketing boards in Canada is now entering a new era. From the creative and conceptual period of marketing boards in the 1920's and early 1930's, and the rejection of the Dominion Marketing Board in the mid-1930's, Canadian agriculture moved into a period of growth of provincial legislation and development of local commodity boards, of which there were 120 in 1970. In the last five years, the climate of opinion has swung in favor of national marketing boards and the Minister of Agriculture tabled legislation (5) on March 17, 1970 that will pave the way for the creation of national farm product marketing agencies. This is comprehensive enabling legislation and does not proscribe any one particular system, method or structure, but it will enable supply management to be effective on a national basis. The Act will establish a National Farm Products Marketing Council, with responsibility for the design, review and supervision of the operation of marketing plans and agencies under the Act. This Council will thus have considerable say in what is and is not acceptable in the operation of supply management schemes. The new era will be a fascinating and significant time for organized marketing of agricultural products in Canada.

Opportunities for Supply Management

With all the restrictions and the limitations, and with the dangers of various quotas and the competition of imports, is there any real scope for supply management in Canadian agriculture?

There appears to be a considerable scope for skillfully operated supply management procedures in Canadian farm product marketing. Using a combination of orderly marketing, in the sense of making supplies available week by week or month by month, and of supply management on a year-to-year basis, both more stable and slightly higher prices could be obtained on the average for producers—not for every producer, perhaps not even for that group of producers who are already well organized, but for the average producer in Canada. These possibilities exist for producers of a wide range of commodities.

Compulsory control, with legal authority to enforce the rules, is the essential power of a marketing board and the essential requirement for supply management. But a marketing board is an institutional mechanism, and supply management is only one tool of the marketing board managers. There are many other tools that must also be put to use to create an effective and efficient marketing operation and to develop a production system and structure to supply food needs efficiently and with satisfactory remuneration, but not undue profit, to all parts of the system. Neither supply management nor national marketing boards are ends in themselves. Among the important goals for agriculture that the Federal Task Force on Agriculture listed were a viable balance of payments, reasonable stability of prices, high per capita net farm incomes, stable net farm incomes, lower costs of production and marketing, and increased mobility out of agriculture (6). Some activities associated with supply management will work for these goals, others against. For example, net farm incomes could be more stable and even higher, but some quota allocation techniques work against mobility out of agriculture and so do higher farm incomes. Marketing costs can be higher unless marketing boards eliminate unnecessary procedures and costs.

The task is a large, complex one, requiring skilled staff and well-developed procedures to succeed. Organizations must have the resources to do a good job and the business volume to justify such resources. There is good scope for supply management in the context of the national market and possibly, in some cases, on a regional basis, where the volume is large and the job can be well done.

The Alternative to Producer Supply Management

In a number of products and in some areas and regions, producers have failed to recognize the advantages to them of organizing fully to obtain the maximum benefits from the market, or have been unable to organize. In addition, the retail structure and much of the processing and wholesaling sector of the Canadian food industry is organized on a large-scale corporate system which needs large

volumes, guaranteed delivery and uniform quality. The economies of scale and the structural and merchandising system of high volume-low margin have reached a level of development where if the supplies are not forthcoming from the existing market mechanism or from that mechanism likely to develop in the near future, then the corporate chains will be forced to integrate much more fully into processing and procurement. They will do this in their own fashion and not necessarily to the advantage of all producers. There will be benefits to many producers in this approach, but the benefits will be primarily to those producers selected by the integrators, and on the terms and conditions which they establish. The terms will not necessarily have as main objectives, high prices to producers or more stable prices, and if other farmers also try to produce the same commodities, the market impact could be serious. At the same time, however, most processors, wholesalers and retail organizations welcome the organization of producers in their marketing activities. The alternatives for producers are simple—they can organize marketing or have it organized for them.

NOTES AND REFERENCES

- (1) "Supply Management and National Marketing Boards", Position Paper for the Canadian Agriculture Congress, March 1969, *Proceedings of the Canadian Agriculture Congress*, Queen's Printer, Cat. No. A21-14/1969.
- (2) Hiscocks, G. A. and H. V. Walker, "Marketing Boards", Research Report for the Federal Task Force on Agriculture, January 1969.
- (3) An explanation of the LIFT (Lower Inventory For Tomorrow) program is contained in "Policy and Program Developments", *Canadian Farm Economics*, Volume 5, Number 1, April 1970, Economics Branch, Canada Department of Agriculture.
- (4) Canadian Wheat Board delivery quotas for the 1970-71 crop year will be based on a total of: a) 25 per cent of the producers' 1969 summerfallow acreage; b) total summerfallow acreage in 1970; and c) the amount by which perennial forage acreage in 1970 exceeds 1969 perennial forage acreage.
- (5) Bill C-197, "An Act to establish the National Farm Products Marketing Council and to authorize the establishment of national marketing agencies for farm products", first reading on March 17, 1970.
- (6) "Economic Goals for Agriculture", Position Paper for the Canadian Agriculture Congress, March 1969, *Proceedings of the Canadian Agriculture Congress*, Queen's Printer, Cat. No. A21-14/1969.

QUOTA APPLICANTS OF THE CANADIAN DAIRY COMMISSION IN 1969 AND THEIR INDICATED INTENTIONS

W. Y. Yang

In early 1969, application forms were mailed by the Canadian Dairy Commission (CDC) to eligible quota holders for renewal of their quota entitlement for the year beginning April 1, 1969. There were seven questions on the form, and applicants were requested to answer these questions accurately and to return the completed form by March 31, 1969. Two of the seven questions concerned personal identification and only the replies to the other five questions were used in this report (1) (2).

The objectives of this analysis were to determine the changes in the composition of the quota-holding producers of manufacturing milk and cream in Canada, to identify their intentions with regard to herd size and to relate these findings to the government support programs.

Of the 106,686 completed application forms received (3), only 100,109 were considered in this study. However, these 100,109 applicants do not represent all the manufacturing milk and cream producers

registered with the CDC. In 1969-70, it was estimated that there were 114,400 registered manufacturing milk and cream producers (4), compared with 130,464 in 1968-69, 149,457 in 1967-68 and 165,061 in 1966-67 (5).

The 12 per cent decrease in the number of manufacturing milk and cream producers from 1968-69 to 1969-70 does not imply that there was a comparable reduction in the amount of butterfat shipped.

Intentions Regarding Herd Size (100,109 replies)

About 48 per cent of the manufacturing milk and cream shippers in Canada who completed the application form for quota renewal intended to increase the size of their milking herds and only about two per cent planned to reduce the number of cows (Table 1). The remainder of the applicants did not have plans to either increase or decrease the size of their herds.

TABLE 1—NUMBER AND PERCENTAGE OF 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO THEIR INTENTIONS REGARDING HERD SIZE, CANADA AND PROVINCES

Intentions Regarding Herd Size	Number of Shippers									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Milk Shippers										
More cows	336	74	106	21,795	8,035	479	4	751	68	31,648
Fewer cows	15	3	6	288	282	10	2	50	8	664
Same number	339	46	140	11,985	8,253	187	10	636	45	21,641
Total	690	123	252	34,068	16,570	676	16	1,437	121	53,953
Cream Shippers										
More cows	767	287	584	4,181	2,495	2,710	3,287	4,140	76	18,527
Fewer cows	39	33	52	100	295	294	324	446	11	1,594
Same number	985	507	873	3,236	5,358	4,825	5,958	7,015	117	28,874
Total	1,791	827	1,509	7,517	8,148	7,829	9,569	11,601	204	48,995
Milk and Cream Shippers										
More cows	1,060	334	668	24,936	10,235	3,086	3,291	4,792	139	48,541
Fewer cows	51	35	56	367	568	302	326	489	19	2,213
Same number	1,286	539	994	14,520	13,322	4,986	5,965	7,586	157	49,355
Total	2,397	908	1,718	39,823	24,125	8,374	9,582	12,867	315	100,109
	Percentage of Shippers									
Milk Shippers										
More cows	49	60	42	64	48	71	25	52	56	59
Fewer cows	2	2	2	1	2	1	13	3	7	1
Same number	49	37	56	35	50	28	63	44	37	40
Total	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
More cows	43	35	39	56	31	35	34	36	37	38
Fewer cows	2	4	3	1	4	4	3	4	5	3
Same number	55	61	58	43	66	62	62	60	57	59
Total	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
More cows	44	37	39	63	42	37	34	37	44	48
Fewer cows	2	4	3	1	2	4	3	4	6	2
Same number	54	59	58	36	55	60	62	59	50	49
Total	100	100	100	100	100	100	100	100	100	100

In Quebec, the most important milk-shipping province, 63 per cent of the applicants intended to increase the number of milking cows. In the other provinces, 34 to 44 per cent of the applicants intended to do so and only one to six per cent planned to keep fewer cows.

In all provinces (except Saskatchewan), the proportion of manufacturing milk shippers intending to increase their herds was considerably higher than the proportion of cream shippers. For Canada as a whole, 59 per cent of manufacturing milk shippers planned to increase the size of their herds, compared with 38 per cent of the cream shippers. In Manitoba and Nova Scotia, 71 and 60 per cent respectively of the milk shippers, compared with 35 per cent of the

cream shippers, were planning to increase the number of cows. In Prince Edward Island, New Brunswick and Quebec, the percentage of milk shippers intending to keep more cows was also higher than that of cream shippers, but the differences were not as large as in the other provinces. In Saskatchewan, a relatively higher percentage of cream shippers, 34 per cent, intended to increase the size of their cow herds, compared with 25 per cent of the milk shippers.

The total quantity of manufacturing milk and cream shipped in 1968-69 by the 1969 quota applicants was 327 million pounds of butterfat (Table 2). This amounted to 94 per cent of the total shipments made by all producers (5), of whom the quota applicants represented only 77 per cent.

TABLE 2—QUANTITY AND PERCENTAGE OF MANUFACTURING MILK AND CREAM SHIPPED IN 1968-69 BY 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO THEIR INTENTIONS REGARDING HERD SIZE, CANADA AND PROVINCES

Intentions Regarding Herd Size	Quantity of Shipment									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	thousand pounds of butterfat									
Milk Shippers										
More cows	1,073	235	307	96,269	51,120	2,170	12	4,327	378	155,893
Fewer cows	15	2	8	679	928	13	6	168	18	1,838
Same number	790	103	417	42,308	42,928	658	27	2,879	221	90,323
Total	1,878	341	732	139,249	94,976	2,841	45	7,374	617	248,054
Cream Shippers										
More cows	1,494	385	1,064	7,797	5,744	4,337	3,951	8,013	118	32,904
Fewer cows	59	28	56	154	427	309	294	554	6	1,888
Same number	1,672	613	1,344	5,197	10,745	6,429	6,565	11,076	129	43,770
Total	3,225	1,026	2,464	13,148	16,916	11,075	10,810	19,643	253	78,562
Milk and Cream Shippers										
More cows	2,567	621	1,371	104,066	56,864	6,508	3,964	12,341	496	188,797
Fewer cows	74	30	64	833	1,356	322	300	722	24	3,725
Same number	2,461	716	1,761	47,499	53,673	7,086	6,591	13,955	350	134,093
Total	5,102	1,367	3,196	152,398	111,893	13,916	10,855	27,018	870	326,615
	Percentage of Shipment									
Milk Shippers										
More cows	57	69	42	69	54	76	27	59	61	63
Fewer cows	1	1	1	a	1	a	14	2	3	1
Same number	42	30	57	30	45	23	59	39	36	36
Total	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
More cows	46	38	43	59	34	39	37	41	47	42
Fewer cows	2	3	2	1	3	3	3	3	2	2
Same number	52	60	55	40	64	58	61	56	51	56
Total	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
More cows	50	45	43	68	51	47	37	46	57	58
Fewer cows	1	2	2	1	1	2	3	3	3	1
Same number	48	52	55	31	48	51	61	52	40	41
Total	100	100	100	100	100	100	100	100	100	100

a Less than .5 per cent.

million pounds; thus, the indicated reduction in total deliveries of manufacturing milk and cream in Canada was only six per cent, although 23 per cent of the 1968-69 quota holders did not apply

The proportion of the total shipment delivered by the applicants who intended to keep more cows was higher than the proportion of these applicants to the total number of applicants; that is, 58 per cent of the butterfat delivered by the 1969 applicants was shipped by the 48 per cent of the applicants who intended to keep more cows. The opposite relationship was observed for those applicants who intended to keep fewer cows; that is, only one per cent of the total butterfat delivered by the 1969 applicants was delivered by the two per cent of the applicants who intended to decrease their cow numbers. These observations hold true for both milk and cream applicants and apply to all provinces. Therefore, one would

infer that milk and cream shippers who intended to increase their cow herds were comparatively larger shippers, and that it was the small shippers who intended to reduce their cow numbers.

From Table 3, it can be seen that the applicants who intended to keep more cows in 1969-70 delivered the highest average amount of butterfat in 1968-69; those who planned to keep the same number of cows made the second highest average shipment; and those who intended to keep fewer cows made the smallest average shipment. The largest absolute differences between the average size of shipments by applicants who intended to keep more cows and the average shipment by those who intended to keep fewer cows amounted to more than 3,000 pounds of butterfat. Differences of this magnitude were observed in the average shipments of milk producers in Ontario, Manitoba and British Columbia. In relative terms,

TABLE 3—AVERAGE SHIPMENT OF MANUFACTURING MILK AND CREAM IN 1968-69 PER 1969 QUOTA APPLICANT, GROUPED ACCORDING TO THEIR INTENTIONS REGARDING HERD SIZE, CANADA AND PROVINCES

Intentions Regarding Herd Size	Average Shipment per Applicant									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
pounds of butterfat										
Milk Shippers										
More cows.....	3,194	3,182	2,895	4,417	6,362	4,350	3,123	5,762	5,559	4,926
Fewer cows.....	993	656	1,385	2,358	3,292	1,286	3,199	3,359	2,252	2,768
Same number.....	2,329	2,250	2,976	3,530	5,202	3,517	2,674	4,527	4,903	4,174
Total.....	2,721	2,772	2,904	4,087	5,732	4,202	2,852	5,132	5,097	4,598
Cream Shippers										
More cows.....	1,948	1,343	1,822	1,865	2,302	1,601	1,202	1,936	1,553	1,776
Fewer cows.....	1,519	857	1,072	1,539	1,449	1,052	907	1,243	509	1,184
Same number.....	1,617	1,209	1,540	1,606	2,005	1,332	1,102	1,579	1,107	1,516
Total.....	1,800	1,241	1,633	1,749	2,076	1,415	1,130	1,693	1,241	1,603
Milk and Cream Shippers										
More cows.....	2,422	1,859	2,052	4,173	5,556	2,109	1,204	2,575	3,569	3,889
Fewer cows.....	1,454	864	1,144	2,270	2,387	1,066	921	1,477	1,243	1,683
Same number.....	1,914	1,329	1,772	3,271	4,029	1,421	1,105	1,840	2,230	2,717
Total.....	2,129	1,506	1,860	3,827	4,638	1,662	1,133	2,100	2,762	3,263
Index of Average Shipment average of all applicants = 100										
Milk Shippers										
More cows.....	117	115	100	108	111	104	110	112	109	107
Fewer cows.....	36	24	48	58	57	31	112	65	44	60
Same number.....	86	81	102	86	91	84	94	88	96	91
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
More cows.....	108	108	112	107	111	113	106	114	125	111
Fewer cows.....	84	69	66	88	70	74	80	73	41	74
Same number.....	90	97	94	92	97	94	98	93	89	95
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
More cows.....	114	123	110	109	120	127	106	123	129	119
Fewer cows.....	68	57	62	59	52	64	81	70	45	52
Same number.....	90	88	95	86	87	86	98	88	81	83
Total.....	100	100	100	100	100	100	100	100	100	100

the average milk shipment per applicant by those who intended to keep more cows amounted to as high as 117, 115 and 110 in Prince Edward Island, Nova Scotia and Ontario, compared with 36, 24, and 57 by those who intended to keep fewer cows (average of all applicants = 100).

The average milk production per cow in Canada in 1968-69 was 7,100 pounds (or 248 pounds of butterfat). Since the difference between the average shipment of manufacturing milk and cream by producers who intended to increase the number of cows and the average shipment by those who intended to reduce their herd size was 2,206 pounds of butterfat, it was estimated that the applicants who planned to increase their cow numbers in 1969-70 had, on the average, about 8 more cows in 1968-69 than the applicants who planned to reduce their herd size.

Share of Cash Receipts from Dairying (98,133 replies)

Cash receipts from the sale of dairy products, including government subsidies, are more important to manufacturing milk producers as a source of farm income than to cream producers (Table 4). For Canada as a whole, 66 per cent of the milk-shipping applicants had receipts from milk sales amounting to more than 70 per cent of their total farm cash receipts, but only 13 per cent of the cream-shipping applicants received such a high percentage of their farm cash receipts from dairy sales. Conversely, only 5 per cent of milk shippers, compared with 47 per cent of cream shippers, received less than 25 per cent of their receipts from dairy sales. These observations also apply to all the provinces.

TABLE 4 — NUMBER AND PERCENTAGE OF 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO THE PERCENTAGE OF 1968-69 FARM CASH RECEIPTS FROM DAIRY SALES, CANADA AND PROVINCES

Percentage of Receipts from Dairy Sales in 1968-69	Number of Shippers									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Milk Shippers										
Less than 25.....	77	19	24	1,256	829	78	3	220	9	2,515
25 to 50.....	234	16	33	2,858	2,142	135	11	383	9	5,821
50 to 70.....	182	25	52	6,070	3,155	131	2	297	11	9,925
70 to 100.....	188	61	140	23,122	10,227	320	—	531	87	34,676
Total.....	681	121	249	33,306	16,353	664	16	1,431	116	52,937
Cream Shippers										
Less than 25.....	331	186	286	695	3,237	4,124	6,920	6,793	78	22,650
25 to 50.....	771	212	441	1,517	2,973	1,962	1,695	2,955	46	12,572
50 to 70.....	405	168	339	2,228	1,038	842	415	968	35	6,438
70 to 100.....	259	235	411	2,846	733	751	348	697	43	6,323
Total.....	1,766	801	1,477	7,286	7,981	7,679	9,378	11,413	202	47,983
Milk and Cream Shippers										
Less than 25.....	398	199	301	1,824	4,001	4,184	6,922	6,974	86	24,889
25 to 50.....	967	221	465	4,098	4,970	2,052	1,704	3,302	54	17,833
50 to 70.....	572	186	380	7,815	4,034	950	417	1,220	46	15,620
70 to 100.....	426	275	539	25,129	10,743	1,028	348	1,181	122	39,791
Total.....	2,363	881	1,685	38,866	23,748	8,214	9,391	12,677	308	98,133
Percentage of Shippers										
Milk Shippers										
Less than 25.....	11	16	10	4	5	12	19	15	8	5
25 to 50.....	34	13	13	9	13	20	69	27	8	11
50 to 70.....	27	21	21	18	19	20	13	21	9	19
70 to 100.....	28	50	56	69	63	48	—	37	75	66
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Less than 25.....	19	23	19	10	41	54	74	60	39	47
25 to 50.....	44	26	30	21	37	26	18	26	23	26
50 to 70.....	23	21	23	31	13	11	4	8	17	13
70 to 100.....	15	29	28	39	9	10	4	6	21	13
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Less than 25.....	17	23	18	5	17	51	74	55	28	25
25 to 50.....	41	25	28	11	21	25	18	26	18	18
50 to 70.....	24	21	23	20	17	12	4	10	15	16
70 to 100.....	18	31	32	65	45	13	4	9	40	41
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

TABLE 5—QUANTITY AND PERCENTAGE OF MANUFACTURING MILK AND CREAM SHIPPED IN 1968-69 BY 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO THE PERCENTAGE OF 1968-69 FARM CASH RECEIPTS FROM DAIRY SALES, CANADA AND PROVINCES

Percentage of Receipts from Dairy Sales in 1968-69	Quantity of Shipment									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	thousand pounds of butterfat									
Milk Shippers										
Less than 25.....	118	31	26	2,395	2,367	233	7	597	28	5,802
25 to 50.....	521	41	77	6,759	8,854	418	32	1,511	21	18,233
50 to 70.....	546	70	132	18,996	16,564	578	7	1,556	30	38,480
70 to 100.....	677	197	492	108,852	66,339	1,569	—	3,685	516	182,326
Total.....	1,862	339	727	137,002	94,124	2,798	46	7,349	595	244,841
Cream Shippers										
Less than 25.....	433	158	312	666	5,538	4,551	6,870	9,066	60	27,655
25 to 50.....	1,451	261	728	2,254	7,356	3,466	2,618	6,531	67	24,732
50 to 70.....	800	252	637	4,148	2,436	1,558	674	2,287	50	12,842
70 to 100.....	512	336	760	5,794	1,368	1,353	478	1,513	75	12,189
Total.....	3,196	1,007	2,437	12,862	16,698	10,928	10,640	19,397	252	77,418
Milk and Cream Shippers										
Less than 25.....	551	189	339	3,061	7,905	4,784	6,876	9,664	88	33,457
25 to 50.....	1,972	302	805	9,013	16,210	3,883	2,649	8,042	88	42,965
50 to 70.....	1,347	322	769	23,144	19,001	2,136	682	3,843	80	51,322
70 to 100.....	1,189	533	1,251	114,646	67,707	2,922	478	5,198	591	194,515
Total.....	5,059	1,346	3,164	149,864	110,823	13,725	10,685	26,747	847	322,259
	Percentage of Shipment									
Milk Shippers										
Less than 25.....	6	9	4	2	3	8	15	8	5	2
25 to 50.....	28	12	11	5	9	15	69	21	4	7
50 to 70.....	29	21	18	14	18	21	16	21	5	16
70 to 100.....	36	58	68	79	70	56	—	50	87	74
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Less than 25.....	14	16	13	5	33	42	65	47	24	36
25 to 50.....	45	26	30	18	44	32	25	34	26	32
50 to 70.....	25	25	26	32	15	14	6	12	20	17
70 to 100.....	16	33	31	45	8	12	4	8	30	16
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Less than 25.....	11	14	11	2	7	35	64	36	10	10
25 to 50.....	39	22	25	6	15	28	25	30	10	13
50 to 70.....	27	24	24	15	17	16	6	14	9	16
70 to 100.....	24	40	40	77	61	21	4	19	70	60
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

In general, the average quantity of butterfat shipped per applicant by milk producers was larger than the average shipment by cream producers (Table 6). As the percentage of cash receipts from dairy sales increased, the average shipment of butterfat per producer became higher. Therefore, the proportion of the total milk and cream delivered by applicants with more than 70 per cent of cash receipts from dairy sales was higher than the proportion of the applicants in this farm receipt bracket; that is, 60 per cent of total 1968-69 deliveries was shipped by the 41 per cent of the applicants who received more than 70 per cent of their farm cash receipts from dairy sales (Table 5). Conversely, 10 per cent of the butterfat delivered was shipped by the 25 per cent of the applicants who received less than 25 per cent of their farm cash receipts from dairy sales.

Of the total 1969 applicants, both milk and cream shippers, 25 per cent received less than 25 per cent of their total farm cash receipts in 1968-69 from dairy products; 18 per cent received between 25 and 50 per cent of total cash receipts from dairy sales; and 57 per cent obtained more than 50 per cent of total receipts from dairy sales. A 1966 survey of 82,700 registered dairy producers showed that 37 per cent of the producers received less than 25 per cent of their total farm cash receipts from dairy sales; 27 per cent received between 25 and 50 per cent from dairy sales; and 36 per cent obtained more than 50 per cent of their total farm cash receipts from dairy sales (6). From 1966 to 1969, the proportion of the producers with more than 50 per cent of their total receipts from dairy sales increased, but the proportion of producers receiving less than 25 per cent of their receipts

TABLE 6—AVERAGE SHIPMENT OF MANUFACTURING MILK AND CREAM IN 1968-69 PER 1969 QUOTA APPLICANT, GROUPED ACCORDING TO THE PERCENTAGE OF 1968-69 FARM CASH RECEIPTS FROM DAIRY SALES, CANADA AND PROVINCES

Percentage of Receipts from Dairy Sales in 1968-69	Average Shipment per Applicant									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
pounds of butterfat										
Milk Shippers										
Less than 25.....	1,528	1,625	1,105	1,907	2,855	2,991	2,239	2,715	3,127	2,307
25 to 50.....	2,228	2,575	2,327	2,365	4,133	3,096	2,865	3,945	2,318	3,132
50 to 70.....	3,000	2,798	2,537	3,129	5,250	4,413	3,699	5,240	2,716	3,877
70 to 100.....	3,600	3,226	3,511	4,708	6,487	4,902	—	6,940	5,932	5,258
Total.....	2,734	2,800	2,919	4,113	5,756	4,214	2,852	5,136	5,129	4,625
Cream Shippers										
Less than 25.....	1,309	851	1,092	958	1,711	1,104	993	1,335	764	1,221
25 to 50.....	1,881	1,231	1,651	1,486	2,474	1,766	1,545	2,210	1,452	1,967
50 to 70.....	1,976	1,498	1,880	1,862	2,347	1,850	1,625	2,362	1,442	1,995
70 to 100.....	1,978	1,431	1,848	2,036	1,866	1,802	1,372	2,171	1,750	1,928
Total.....	1,810	1,257	1,650	1,765	2,092	1,423	1,135	1,700	1,248	1,613
Milk and Cream Shippers										
Less than 25.....	1,384	951	1,125	1,678	1,976	1,143	993	1,386	1,020	1,344
25 to 50.....	2,039	1,367	1,731	2,199	3,262	1,893	1,555	2,435	1,623	2,409
50 to 70.....	2,354	1,729	2,024	2,961	4,710	2,248	1,635	3,150	1,746	3,286
70 to 100.....	2,792	1,939	2,321	4,562	6,302	2,842	1,372	4,402	4,847	4,888
Total.....	2,141	1,528	1,878	3,856	4,667	1,671	1,138	2,110	2,750	3,284
Index of Average Shipment average of all applicants = 100										
Milk Shippers										
Less than 25.....	56	58	38	46	50	71	78	53	61	50
25 to 50.....	82	92	80	58	72	74	100	77	45	68
50 to 70.....	110	100	87	76	91	105	130	102	53	84
70 to 100.....	132	115	120	114	113	116	—	135	116	114
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Less than 25.....	72	68	66	54	82	78	88	78	61	76
25 to 50.....	104	98	100	84	118	124	136	130	116	122
50 to 70.....	109	119	114	106	112	130	143	139	116	124
70 to 100.....	109	114	112	115	84	127	121	128	140	120
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Less than 25.....	65	62	60	44	42	68	87	66	37	41
25 to 50.....	95	90	92	57	70	113	137	115	59	73
50 to 70.....	110	113	108	77	101	134	144	149	64	100
70 to 100.....	130	127	124	118	135	170	121	209	176	149
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

from dairying decreased. These changes took place in all provinces. This shows the general trend toward specialization in the industry.

Acreage of Cultivated Land (98,531 replies)

A higher percentage of the cream-shipping applicants had smaller cultivated acreages than milk-shipping applicants in the same province (Table 7). For example, 33 per cent of the cream-shipping applicants in Prince Edward Island, compared with only 21 per cent of the milk shippers there, had a cultivated land area of less than 73 acres, and only 14 per cent of the cream shippers in that province, compared with 25 per cent of the milk shippers, had cultivated acreages larger than 160 acres. A similar relationship

existed in all other provinces.

For both milk and cream shippers, there was a positive relationship between the size of cultivated area and the average quantity of butterfat shipped per producer (Table 9). As the cultivated area became larger, the average quantity of butterfat shipped per applicant increased. As a result, the 40 per cent of the producers in Canada with more than 160 acres of cultivated land contributed 42 per cent of the butterfat (Table 8). This seems to indicate that, within a province or a region, the size of cultivated area was not an important factor affecting the combination of crop and dairy production and that a larger cultivated area does not necessarily signify more specialization in cash crops and less in dairy production.

TABLE 7—NUMBER AND PERCENTAGE OF 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO ACREAGE OF CULTIVATED LAND, CANADA AND PROVINCES

Acres of Cultivated Land	Number of Shippers									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Milk Shippers										
Up to 17.9.....	3	3	5	189	78	11	—	5	16	310
18 to 32.9.....	20	16	11	568	215	18	—	7	35	890
33 to 72.9.....	121	39	56	6,123	1,937	64	—	26	49	8,415
73 to 159.9.....	368	52	132	19,872	8,949	56	1	226	16	29,772
160 to 319.9.....	150	10	43	6,675	4,838	204	7	612	2	12,541
320 to 479.9.....	11	1	2	344	367	101	2	344	—	1,172
480 to 639.9.....	5	—	—	52	53	52	3	127	—	292
640 and more.....	—	1	1	35	14	45	3	71	—	170
Total.....	678	122	250	33,858	16,451	651	16	1,418	118	53,562
Cream Shippers										
Up to 17.9.....	24	61	51	90	102	95	29	60	19	531
18 to 32.9.....	99	160	137	269	222	126	27	74	36	1,150
33 to 72.9.....	465	320	492	2,013	1,309	464	101	280	58	5,502
73 to 159.9.....	944	226	628	3,928	4,704	1,386	776	1,957	47	14,596
160 to 319.9.....	238	45	164	1,095	1,605	2,789	2,689	4,261	26	12,912
320 to 479.9.....	10	5	15	45	93	1,505	2,394	2,541	8	6,616
480 to 639.9.....	2	—	2	4	4	660	1,614	1,174	3	3,463
640 and more.....	—	1	1	3	7	414	1,630	947	2	3,005
Total.....	1,782	818	1,490	7,447	8,046	7,439	9,260	11,294	199	47,775
Milk and Cream Shippers										
Up to 17.9.....	26	64	53	262	179	104	29	62	32	811
18 to 32.9.....	118	172	147	792	425	141	27	80	69	1,971
33 to 72.9.....	570	344	533	7,694	3,192	518	101	305	102	13,359
73 to 159.9.....	1,266	261	744	22,878	13,313	1,518	777	2,151	63	42,971
160 to 319.9.....	368	50	199	7,473	6,272	2,954	2,694	4,804	28	24,842
320 to 479.9.....	21	6	17	374	449	1,581	2,396	2,848	8	7,700
480 to 639.9.....	7	—	2	55	56	698	1,616	1,286	3	3,723
640 and more.....	—	1	2	36	20	450	1,633	1,010	2	3,154
Total.....	2,376	898	1,697	39,564	23,906	7,964	9,273	12,546	307	98,531
Percentage of Shippers										
Milk Shippers										
Up to 17.9.....	a	2	2	1	a	2	—	a	14	1
18 to 32.9.....	3	13	4	2	1	3	—	a	30	2
33 to 72.9.....	18	32	22	18	12	10	—	2	42	16
73 to 159.9.....	54	43	53	59	54	24	6	16	14	56
160 to 319.9.....	22	8	17	20	29	31	44	43	2	23
320 to 479.9.....	2	1	1	1	2	16	13	24	—	2
480 to 639.9.....	1	—	—	a	a	8	19	9	—	1
640 and more.....	—	1	a	a	a	7	19	5	—	a
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Up to 17.9.....	1	7	3	1	1	1	a	1	10	1
18 to 32.9.....	6	20	9	4	3	2	a	1	18	2
33 to 72.9.....	26	39	33	27	16	6	1	2	29	12
73 to 159.9.....	53	28	42	53	58	19	8	17	24	31
160 to 319.9.....	13	6	11	15	20	37	29	38	13	27
320 to 479.9.....	1	1	1	1	1	20	26	22	4	14
480 to 639.9.....	a	—	a	a	a	9	17	10	2	7
640 and more.....	—	a	a	a	a	6	18	8	1	6
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Up to 17.9.....	1	7	3	1	1	1	a	a	10	1
18 to 32.9.....	5	19	9	2	2	2	a	1	22	2
33 to 72.9.....	24	38	31	19	13	7	1	2	33	14
73 to 159.9.....	53	29	44	58	56	19	8	17	21	44
160 to 319.9.....	15	6	12	19	26	37	29	38	9	25
320 to 479.9.....	1	1	1	1	2	20	26	23	3	8
480 to 639.9.....	a	—	a	a	a	9	17	10	1	4
640 and more.....	—	a	a	a	a	6	18	8	1	3
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

a Less than one per cent.

TABLE 8—QUANTITY AND PERCENTAGE OF MANUFACTURING MILK AND CREAM SHIPPED IN 1968-69
BY 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO ACREAGE OF CULTIVATED LAND,
CANADA AND PROVINCES

Acres of Cultivated Land	Quantity of Shipment									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
thousand pounds of butterfat										
Milk Shippers										
Up to 17.9.....	1	3	3	249	136	34	—	9	40	474
18 to 32.9.....	25	26	10	723	441	42	—	31	138	1,437
33 to 72.9.....	193	95	104	13,587	5,607	191	—	70	276	20,123
73 to 159.9.....	924	175	443	80,424	46,711	563	1	923	138	130,304
160 to 319.9.....	619	32	151	40,218	37,120	840	18	3,007	18	82,024
320 to 479.9.....	63	6	12	2,864	3,804	497	7	2,003	—	9,255
480 to 639.9.....	35	—	—	414	572	312	9	751	—	2,094
640 and more.....	—	3	—	196	154	304	9	501	—	1,170
Total.....	1,861	340	725	138,675	94,545	2,783	46	7,295	610	246,881
Cream Shippers										
Up to 17.9.....	17	42	40	78	92	114	24	55	16	477
18 to 32.9.....	110	117	140	193	225	159	25	81	36	1,085
33 to 72.9.....	545	387	578	2,316	1,833	596	92	312	77	6,737
73 to 159.9.....	1,787	368	1,148	7,474	9,357	1,795	725	2,832	77	26,163
160 to 319.9.....	711	90	464	2,866	4,347	3,940	2,963	7,365	30	22,776
320 to 479.9.....	39	17	67	126	293	2,295	2,764	4,492	11	10,104
480 to 639.9.....	7	—	4	11	23	1,046	1,909	2,130	1	5,132
640 and more.....	—	—	—	3	12	660	2,014	2,015	1	4,706
Total.....	3,216	1,021	2,441	13,067	16,782	10,605	10,516	19,282	250	77,180
Milk and Cream Shippers										
Up to 17.9.....	19	45	42	327	228	148	24	64	56	952
18 to 32.9.....	135	142	150	917	666	201	25	112	174	2,522
33 to 72.9.....	738	482	682	15,902	7,441	787	92	382	354	26,860
73 to 159.9.....	2,710	543	1,592	87,898	56,669	2,357	727	3,756	215	156,467
160 to 319.9.....	1,330	122	615	43,084	41,466	4,780	2,981	10,371	48	104,860
320 to 479.9.....	102	23	78	2,990	4,097	2,792	2,771	6,495	11	19,358
480 to 639.9.....	43	—	4	425	595	1,358	1,918	2,881	1	7,226
640 and more.....	—	3	2	200	166	965	2,024	2,516	1	5,876
Total.....	5,077	1,260	3,165	151,743	111,328	13,388	10,562	26,577	860	324,061
Percentage of Shipment										
Milk Shippers										
Up to 17.9.....	a	1	a	a	a	1	—	a	7	a
18 to 32.9.....	1	8	1	1	a	2	—	a	23	1
33 to 72.9.....	10	28	14	10	6	7	—	1	45	8
73 to 159.9.....	50	52	61	58	49	10	3	13	23	53
160 to 319.9.....	33	9	21	29	39	30	40	41	3	33
320 to 479.9.....	3	2	2	2	4	18	16	27	—	4
480 to 639.9.....	2	—	—	a	1	11	19	10	—	1
640 and more.....	—	1	a	a	a	11	21	7	—	a
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Up to 17.9.....	1	4	2	1	1	1	a	a	6	1
18 to 32.9.....	3	11	6	1	1	1	a	a	14	1
33 to 72.9.....	17	38	24	18	11	6	1	2	31	9
73 to 159.9.....	56	36	47	57	59	17	7	15	31	34
160 to 319.9.....	22	9	19	22	26	37	28	38	12	30
320 to 479.9.....	1	2	3	1	2	22	26	23	4	13
480 to 639.9.....	a	—	a	a	a	10	18	11	1	7
640 and more.....	—	—	—	a	a	6	19	10	a	6
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Up to 17.9.....	—	3	1	a	a	1	a	a	7	a
18 to 32.9.....	3	10	5	1	1	2	a	a	20	1
33 to 72.9.....	15	35	22	10	7	6	1	1	41	8
73 to 159.9.....	53	40	50	58	51	18	7	14	25	48
160 to 319.9.....	26	9	19	28	37	36	28	39	6	32
320 to 479.9.....	2	2	2	2	4	21	26	24	1	6
480 to 639.9.....	1	—	a	a	1	10	18	11	a	2
640 and more.....	—	a	a	a	a	7	19	9	a	2
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

a Less than one per cent.

TABLE 9—AVERAGE SHIPMENT OF MANUFACTURING MILK AND CREAM IN 1968-69 PER 1969 QUOTA APPLICANT, GROUPED ACCORDING TO ACREAGE OF CULTIVATED LAND, CANADA AND PROVINCES

Acres of Cultivated Land	Average Shipment per Producer									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
pounds of butterfat										
Milk Shippers										
Up to 17.9	426	884	569	1,315	1,745	3,087	—	1,770	2,497	1,530
18 to 32.9	1,268	1,618	908	1,273	2,049	2,340	—	4,488	3,949	1,614
33 to 72.9	1,592	2,436	1,859	2,219	2,895	2,990	—	2,690	5,631	2,391
73 to 159.9	2,511	3,372	3,356	4,047	5,220	3,606	1,518	4,086	8,611	4,377
160 to 319.9	4,129	3,205	3,515	6,015	7,672	4,117	2,634	4,913	9,168	6,540
320 to 479.9	5,752	5,806	5,847	8,325	10,364	4,920	3,694	5,821	—	7,897
480 to 639.9	7,067	—	—	7,959	10,797	5,997	2,950	5,916	—	7,170
640 and more	—	—	—	—	10,997	6,768	3,144	7,057	—	6,884
Total	2,745	2,785	2,900	4,096	5,747	4,175	2,852	5,145	5,171	4,609
Cream Shippers										
Up to 17.9	729	684	773	866	902	1,200	807	922	843	899
18 to 32.9	1,111	728	1,018	719	1,015	1,262	938	1,092	983	944
33 to 72.9	1,172	1,210	1,175	1,150	1,400	1,285	910	1,114	1,338	1,224
73 to 159.9	1,893	1,626	1,829	1,903	2,117	1,295	935	1,447	1,649	1,793
160 to 319.9	2,986	2,008	2,828	2,617	2,708	1,413	1,102	1,728	—	1,764
320 to 479.9	3,882	3,462	4,435	2,798	3,153	1,525	1,154	1,768	—	1,527
480 to 639.9	3,689	—	2,232	2,820	5,762	1,584	1,183	1,814	—	1,482
640 and more	—	—	—	—	—	1,594	1,236	2,128	—	1,566
Total	1,805	1,248	1,638	1,755	2,086	1,426	1,136	1,707	1,257	1,616
Milk and Cream Shippers										
Up to 17.9	722	693	797	1,246	1,274	1,423	807	1,035	1,749	1,173
18 to 32.9	1,147	828	1,017	1,157	1,567	1,427	938	1,403	2,516	1,280
33 to 72.9	1,294	1,402	1,280	2,067	2,331	1,520	910	1,252	3,466	2,011
73 to 159.9	2,141	2,080	2,139	3,842	4,257	1,553	935	1,746	3,417	3,641
160 to 319.9	3,614	2,448	3,090	5,765	6,611	1,618	1,107	2,159	1,732	4,219
320 to 479.9	4,861	3,852	4,601	7,994	9,124	1,766	1,157	2,281	1,374	2,514
480 to 639.9	6,102	—	—	7,730	10,631	1,945	1,187	2,240	463	1,941
640 and more	—	3,000	—	—	—	2,144	1,239	2,491	588	1,863
Total	2,137	1,515	1,866	3,835	4,657	1,681	1,139	2,118	2,803	3,289
Index of Average Shipment										
average of all applicants = 100										
Milk Shippers										
Up to 17.9	16	32	20	32	30	72	—	34	48	33
18 to 32.9	46	58	31	31	37	55	—	87	76	35
33 to 72.9	58	88	64	54	50	70	—	52	109	52
73 to 159.9	92	121	116	99	91	84	53	79	166	95
160 to 319.9	150	115	121	147	134	96	92	96	177	142
320 to 479.9	210	208	202	203	180	115	130	113	—	171
480 to 639.9	257	—	—	194	188	140	103	115	—	156
640 and more	—	—	—	—	191	158	110	137	—	149
Total	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Up to 17.9	40	55	47	49	43	84	71	54	67	56
18 to 32.9	62	58	62	41	49	88	83	64	78	58
33 to 72.9	65	97	72	66	67	90	80	65	106	76
73 to 159.9	105	130	112	108	102	91	82	85	131	111
160 to 319.9	165	161	173	149	130	99	97	101	—	109
320 to 479.9	215	277	271	159	151	107	102	110	—	94
480 to 639.9	204	—	136	161	276	111	104	106	—	92
640 and more	—	—	—	—	—	112	109	125	—	97
Total	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Up to 17.9	34	46	43	32	27	85	71	49	62	36
18 to 32.9	60	55	54	30	34	85	82	66	90	39
33 to 72.9	61	92	69	54	50	90	80	59	124	61
73 to 159.9	100	137	115	100	91	92	82	82	122	111
160 to 319.9	169	162	166	150	142	96	97	102	62	128
320 to 479.9	228	254	247	208	196	105	102	108	49	76
480 to 639.9	286	—	—	202	228	116	104	106	16	59
640 and more	—	198	—	—	—	128	109	118	21	57
Total	100	100	100	100	100	100	100	100	100	100

— = nil.

Off-Farm Employment (95,190 replies)

In Canada as a whole, and in most of the provinces, more than 80 per cent of the milk-and cream-

shipping applicants had no off-farm employment (Table 10). In Ontario and the four western provinces, more than 70 per cent of the applicants who had off-farm employment worked away from their

TABLE 10—NUMBER AND PERCENTAGE OF 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO LENGTH OF OFF-FARM EMPLOYMENT IN 1968-69, CANADA AND PROVINCES

Length of Off-farm Employment	Number of Shippers									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Milk Shippers										
No off-farm employment.....	572	92	196	28,766	13,709	512	10	1,236	76	45,169
Off-farm employment for										
1 to 3 months.....	18	5	9	1,014	157	8	—	21	1	1,233
4 to 6 months.....	15	2	11	1,151	235	17	—	9	2	1,442
7 to 9 months.....	4	4	3	356	132	3	—	4	1	507
10 to 12 months.....	44	16	22	1,222	1,702	107	5	108	33	3,259
sub-total.....	81	27	45	3,743	2,226	135	5	142	37	6,441
Total.....	653	119	241	32,509	15,935	647	15	1,378	113	51,610
Cream Shippers										
No off-farm employment.....	1,463	636	1,154	6,002	6,778	6,122	7,691	9,342	149	39,337
Off-farm employment for										
1 to 3 months.....	29	30	49	345	136	54	45	136	2	826
4 to 6 months.....	56	21	78	441	159	122	71	148	13	1,109
7 to 9 months.....	19	20	29	86	76	64	71	85	3	453
10 to 12 months.....	125	79	111	251	653	992	1,086	1,248	31	4,576
sub-total.....	229	150	167	1,123	1,024	1,232	1,273	1,617	49	6,964
Total.....	1,692	786	1,421	7,125	7,802	7,354	8,964	10,959	198	46,301
Milk and Cream Shippers										
No off-farm employment.....	1,965	693	1,317	33,298	19,974	6,530	7,700	10,438	216	82,131
Off-farm employment for										
1 to 3 months.....	45	34	56	1,289	285	59	45	152	3	1,968
4 to 6 months.....	68	22	86	1,509	386	137	71	153	15	2,447
7 to 9 months.....	23	24	30	422	206	67	71	88	4	935
10 to 12 months.....	164	92	132	1,434	2,311	1,081	1,089	1,343	63	7,709
sub-total.....	300	172	304	4,654	3,188	1,344	1,276	1,736	85	13,059
Total.....	2,265	865	1,621	37,952	23,162	7,874	8,976	12,174	301	95,190
Percentage of Shippers										
Milk Shippers										
No off-farm employment.....	88	77	81	88	86	79	67	90	67	88
Off-farm employment for										
1 to 3 months.....	3	4	4	3	1	1	—	2	1	2
4 to 6 months.....	2	2	5	4	1	3	—	1	2	3
7 to 9 months.....	1	3	1	1	1	—	—	1	1	1
10 to 12 months.....	7	13	9	4	11	17	33	8	29	6
sub-total.....	12	23	19	12	14	21	33	10	33	12
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
No off-farm employment.....	86	81	81	84	87	83	86	85	75	85
Off-farm employment for										
1 to 3 months.....	2	4	3	5	2	1	1	1	1	2
4 to 6 months.....	3	3	5	6	2	2	1	1	7	2
7 to 9 months.....	1	3	2	1	1	1	1	1	2	1
10 to 12 months.....	8	10	8	4	8	13	12	11	16	10
sub-total.....	14	19	19	16	13	17	14	15	25	15
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
No off-farm employment.....	87	80	81	88	86	83	86	86	72	86
Off-farm employment for										
1 to 3 months.....	2	4	3	3	1	1	1	1	1	2
4 to 6 months.....	3	3	5	4	2	2	1	1	5	3
7 to 9 months.....	1	3	2	1	1	1	1	1	1	1
10 to 12 months.....	8	11	8	4	10	14	12	11	21	8
sub-total.....	13	20	19	12	14	17	14	14	28	14
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

a Less than one per cent.

TABLE 11—QUANTITY AND PERCENTAGE OF MANUFACTURING MILK AND CREAM SHIPPED IN 1968-69 BY 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO LENGTH OF OFF-FARM EMPLOYMENT IN 1968-69, CANADA AND PROVINCES

Length of Off-farm Employment	Quantity of Shipment									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	thousand pounds of butterfat									
Milk Shippers										
No off-farm employment.....	1,591	262	607	123,479	80,756	2,206	34	6,400	387	215,723
Off-farm employment for										
1 to 3 months.....	32	8	17	2,899	611	17	—	72	2	3,659
4 to 6 months.....	30	7	15	2,742	718	42	—	30	7	3,589
7 to 9 months.....	8	6	3	793	413	4	—	10	3	1,242
10 to 12 months.....	125	50	55	3,479	9,159	453	10	589	183	14,103
sub-total.....	195	71	90	9,913	10,901	516	10	701	195	22,593
Total.....	1,786	333	697	133,392	91,657	2,722	44	7,101	582	238,316
Cream Shippers										
No off-farm employment.....	2,733	844	1,990	10,932	14,427	8,916	8,837	16,054	190	64,923
Off-farm employment for										
1 to 3 months.....	34	32	65	514	229	56	41	189	3	1,163
4 to 6 months.....	63	16	95	525	243	125	60	190	16	1,333
7 to 9 months.....	22	14	36	90	124	69	59	100	3	517
10 to 12 months.....	202	79	145	403	1,247	1,273	1,196	2,095	34	6,675
sub-total.....	321	141	341	1,532	1,843	1,523	1,356	2,575	56	9,688
Total.....	3,054	985	2,331	12,464	16,270	10,439	10,193	18,629	246	74,611
Milk and Cream Shippers										
No off-farm employment.....	4,324	1,106	2,597	134,410	95,183	11,122	8,871	22,455	578	280,646
Off-farm employment for										
1 to 3 months.....	66	40	82	3,413	839	74	41	262	4	4,821
4 to 6 months.....	93	22	110	3,267	961	166	60	219	23	4,922
7 to 9 months.....	30	21	39	883	538	73	59	110	6	1,759
10 to 12 months.....	327	130	200	3,882	10,406	1,726	1,206	2,684	217	20,778
sub-total.....	516	213	431	11,445	12,744	2,039	1,366	3,275	250	32,280
Total.....	4,840	1,319	3,028	145,855	107,927	13,161	10,237	25,730	828	312,916
	Percentage of Shipment									
Milk Shippers										
No off-farm employment.....	89	79	87	93	88	81	77	90	67	91
Off-farm employment for										
1 to 3 months.....	2	2	2	2	1	1	—	1	a	2
4 to 6 months.....	2	2	2	2	1	2	—	a	1	2
7 to 9 months.....	a	2	a	1	a	a	—	a	1	1
10 to 12 months.....	7	15	8	3	10	17	23	8	31	6
sub-total.....	11	21	13	7	12	19	23	10	33	9
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
No off-farm employment.....	89	86	85	88	89	85	87	86	77	87
Off-farm employment for										
1 to 3 months.....	1	3	3	4	1	1	a	1	1	2
4 to 6 months.....	2	2	4	4	1	1	1	1	6	2
7 to 9 months.....	1	1	2	1	1	1	1	1	1	1
10 to 12 months.....	7	8	6	3	8	12	12	11	14	9
sub-total.....	11	14	15	12	11	15	13	14	23	13
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
No off-farm employment.....	89	84	86	92	88	85	87	87	70	90
Off-farm employment for										
1 to 3 months.....	1	3	3	2	1	1	a	1	1	2
4 to 6 months.....	2	2	4	2	1	1	1	1	3	2
7 to 9 months.....	1	2	1	1	a	1	1	a	1	1
10 to 12 months.....	7	10	7	3	10	13	12	10	26	7
sub-total.....	11	16	14	8	12	15	13	13	30	10
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

a Less than one per cent.

farms for from 10 to 12 months. Off-farm employment of shorter duration was more important in the Maritime Provinces and Quebec.

The percentages of applicants with or without off-

farm employment varied slightly between the provinces and no significant differences could be noted between the cream and milk shippers.

Producers with no off-farm employment had larger

TABLE 12—AVERAGE SHIPMENT OF MANUFACTURING MILK AND CREAM IN 1968-69 PER 1969
QUOTA APPLICANT, GROUPED ACCORDING TO LENGTH OF OFF-FARM EMPLOYMENT IN 1968-69,
CANADA AND PROVINCES

Length of Off-farm Employment	Average Shipment per Producer									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
pounds of butterfat										
Milk Shippers										
No off-farm employment.....	2,782	2,846	3,098	4,293	5,891	4,309	3,384	5,178	5,096	4,776
Off-farm employment for										
1 to 3 months.....	1,790	1,586	1,862	2,859	3,891	2,155	—	3,433	1,957	2,967
4 to 6 months.....	1,983	3,278	1,339	2,382	3,054	2,454	—	3,288	3,543	2,489
7 to 9 months.....	2,083	1,591	1,070	2,227	3,131	1,474	—	2,618	2,976	2,449
10 to 12 months.....	2,842	3,156	2,507	2,847	5,381	4,233	2,053	5,452	5,531	4,328
sub-total.....	2,412	2,642	1,997	2,648	4,897	3,825	2,053	4,936	5,258	3,508
Total.....	2,736	2,800	2,892	4,103	5,752	4,208	2,941	5,153	5,149	4,618
Cream Shippers										
No off-farm employment.....	1,868	1,328	1,725	1,821	2,128	1,456	1,149	1,718	1,278	1,650
Off-farm employment for										
1 to 3 months.....	1,162	1,070	1,324	1,489	1,682	1,048	909	1,395	1,206	1,408
4 to 6 months.....	1,132	753	1,218	1,190	1,528	1,023	851	1,282	1,228	1,202
7 to 9 months.....	1,163	715	1,230	1,051	1,638	1,071	824	1,176	989	1,141
10 to 12 months.....	1,613	1,002	1,308	1,606	1,909	1,284	1,101	1,679	1,106	1,459
sub-total.....	1,401	943	1,276	1,364	1,800	1,237	1,065	1,592	1,135	1,391
Total.....	1,805	1,254	1,640	1,749	2,085	1,419	1,137	1,700	1,243	1,611
Milk and Cream Shippers										
No off-farm employment.....	2,201	1,596	1,972	4,037	4,765	1,703	1,152	2,151	2,675	3,417
Off-farm employment for										
1 to 3 months.....	1,465	1,177	1,458	2,648	2,947	1,251	909	1,722	1,456	2,450
4 to 6 months.....	1,370	1,017	1,276	2,165	2,489	1,216	851	1,434	1,537	2,011
7 to 9 months.....	1,323	861	1,296	2,093	2,611	1,089	824	1,255	1,486	1,881
10 to 12 months.....	1,992	1,410	1,518	2,707	4,503	1,597	1,108	1,998	3,442	2,695
sub-total.....	1,721	1,237	1,417	2,459	3,998	1,518	1,071	1,887	2,943	2,472
Total.....	2,137	1,525	1,868	3,843	4,660	1,671	1,140	2,114	2,751	3,287
Index of Average Shipment average of all applicants = 100										
Milk Shippers										
No off-farm employment.....	102	102	107	105	102	102	115	100	99	103
Off-farm employment for										
1 to 3 months.....	65	57	64	70	68	51	—	67	38	64
4 to 6 months.....	72	117	46	58	53	58	—	64	69	54
7 to 9 months.....	76	57	37	54	54	35	—	51	58	53
10 to 12 months.....	104	113	87	69	94	101	70	106	107	94
sub-total.....	88	94	69	64	—	91	70	96	102	46
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
No off-farm employment.....	104	106	105	104	102	103	101	101	103	102
Off-farm employment for										
1 to 3 months.....	64	85	81	85	81	74	80	82	97	87
4 to 6 months.....	63	60	74	68	73	72	75	75	99	75
7 to 9 months.....	64	57	75	60	79	76	72	69	80	71
10 to 12 months.....	89	80	80	92	92	90	97	99	89	91
sub-total.....	78	75	78	78	86	87	94	94	91	86
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
No off-farm employment.....	103	105	106	105	102	102	101	102	97	104
Off-farm employment for										
1 to 3 months.....	69	77	78	69	63	75	80	81	53	74
4 to 6 months.....	64	67	68	56	53	73	75	68	56	61
7 to 9 months.....	62	56	69	54	56	65	72	59	54	57
10 to 12 months.....	93	92	81	70	97	96	97	94	125	82
sub-total.....	80	81	76	64	86	91	94	89	107	75
Total.....	100	100	100	100	100	100	100	100	100	100

— = nil.

average shipments of butterfat per producer than producers with off-farm employment (Table 12). This was true for all provinces and for both milk and cream shippers, but the differences in shipment size were proportionately larger for milk producers. In

Quebec, for example, milk producers without off-farm employment made an average shipment of 4,300 pounds of butterfat, while those with off-farm employment had an average shipment of 2,600 pounds. The average size of cream shipment in Quebec was

1,800 pounds for applicants without off-farm work and 1,400 for those with off-farm work.

Thus, producers with no off-farm employment delivered relatively more butterfat, in proportion to their numbers, than did those who had off-farm work. For example, 86 per cent of the milk shippers and 87 per cent of the cream shippers in Ontario did not have off-farm employment and contributed 88 and 89 per cent respectively of the total butterfat shipments (Table 11), but 14 per cent of the milk shippers and 13 per cent of the cream shippers had off-farm employment and delivered only 12 and 11 per cent of the total butterfat.

As expected, the proportion of shippers with off-farm employment in 1969 was lower than in 1966, in Canada and in all provinces except Manitoba and Saskatchewan. In 1966, the percentage of dairy farmers reporting off-farm work was 31 per cent in Canada and 20 to 45 per cent in the provinces (6), compared with 14 per cent in Canada and 12 to 28 per cent in the provinces in 1969. In Manitoba, the percentage of dairy producers with off-farm employment increased from 16 per cent in 1966 to 17 per cent in 1969: in Saskatchewan, the increase was from 13 per cent to 14 per cent during the same period. These differences are too small to be of much significance.

TABLE 13—NUMBER AND PERCENTAGE OF 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO AGE OF APPLICANTS, CANADA AND PROVINCES

Age	Number of Shippers									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
Milk Shippers										
Under 35.....	82	11	21	5,495	2,278	110	1	216	14	8,228
35 to 54.....	338	62	132	19,248	8,809	411	10	866	69	29,945
55 to 59.....	105	26	38	4,269	2,128	76	2	157	11	6,812
60 to 64.....	79	12	34	2,779	1,574	36	1	110	15	4,640
65 and over.....	78	12	25	2,105	1,650	39	1	74	10	3,994
Total.....	682	123	250	33,896	16,439	672	15	1,423	119	53,619
Cream Shippers										
Under 35.....	186	47	127	795	698	724	1,088	1,457	13	5,135
35 to 54.....	845	323	715	4,064	4,092	4,493	5,719	6,752	120	27,123
55 to 59.....	257	147	254	1,159	1,262	1,175	1,242	1,496	30	7,022
60 to 64.....	218	122	195	802	995	774	855	1,041	20	5,022
65 and over.....	264	186	206	656	1,028	595	570	725	19	4,249
Total.....	1,770	825	1,497	7,476	8,075	7,761	9,474	11,471	202	48,551
Milk and Cream Shippers										
Under 35.....	252	57	142	6,078	2,873	815	1,089	1,643	26	12,975
35 to 54.....	1,144	364	824	22,305	12,572	4,824	5,727	7,504	181	55,445
55 to 59.....	351	159	289	5,167	3,315	1,236	1,243	1,642	41	13,443
60 to 64.....	288	130	220	3,418	2,526	804	856	1,145	34	9,421
65 and over.....	336	196	229	2,652	2,638	626	571	794	29	8,071
Total.....	2,371	906	1,704	39,620	23,924	8,305	9,486	12,728	311	99,355
Average age.....	51	54	51	47	49	49	48	47	47	48
Percentage of Shippers										
Milk Shippers										
Under 35.....	12	9	8	16	14	16	7	15	12	15
35 to 54.....	50	50	53	57	54	61	67	61	58	56
55 to 59.....	15	21	15	13	13	11	13	11	9	13
60 to 64.....	12	10	14	8	10	5	7	8	13	9
65 and over.....	11	10	10	6	10	6	7	5	8	7
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Under 35.....	11	6	8	11	9	9	11	13	6	11
35 to 54.....	48	39	48	54	51	58	60	59	59	56
55 to 59.....	15	18	17	16	16	15	13	13	15	14
60 to 64.....	12	15	13	11	12	10	9	9	10	10
65 and over.....	15	23	14	9	13	8	6	6	9	9
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Under 35.....	11	6	8	15	12	10	11	13	8	13
35 to 54.....	48	40	48	56	53	58	60	59	58	56
55 to 59.....	15	18	17	13	14	15	13	13	13	14
60 to 64.....	12	14	13	9	11	10	9	9	11	9
65 and over.....	14	22	13	7	11	8	6	6	9	8
Total.....	100	100	100	100	100	100	100	100	100	100

Age of Applicants (99,355 replies)

There was virtually no change in the age level and composition of quota holders in Canada from 1966 (6) to 1969 (Table 13). In both 1966 and 1969, the average age of dairy producers was 48 years for Canada and from 47 to 51 years for all provinces, except Nova Scotia where the average age of dairy producers was 55 in 1966 and 54 in 1969. Applicants from the Maritime provinces appeared to have higher average ages (51 to 54 years) than those from other provinces (47 to 49 years).

Applicants under 35 years of age constituted from seven per cent (in Saskatchewan) to 16 per cent (in Quebec and Manitoba) of the manufacturing milk shippers and from six per cent (in Nova Scotia and British Columbia) to 13 per cent (in Alberta) of the cream shippers. Applicants more than 60 years old represented from 11 per cent (in Manitoba) to 24 per cent (in New Brunswick) of manufacturing milk shippers, and from 15 per cent (in Alberta and Saskatchewan) to 38 per cent (in Nova Scotia) of the cream shippers. Thus, milk shippers had a relatively higher proportion of young producers than cream

TABLE 14—QUANTITY AND PERCENTAGE OF MANUFACTURING MILK AND CREAM SHIPPED IN 1968-69 BY 1969 QUOTA APPLICANTS, GROUPED ACCORDING TO AGE OF APPLICANTS, CANADA AND PROVINCES

Age	Quantity of Shipment									
	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
thousand pounds of butterfat										
Milk Shippers										
Under 35.....	225	26	49	25,765	14,915	475	4	1,128	116	42,702
35 to 54.....	984	185	424	82,459	54,251	1,828	30	4,680	360	145,203
55 to 59.....	305	66	109	15,104	10,856	252	5	697	36	27,430
60 to 64.....	164	35	80	9,086	7,340	119	3	473	63	17,362
65 and over.....	189	29	63	6,167	6,976	146	1	317	34	13,921
Total.....	1,867	341	725	138,579	94,338	2,821	43	7,295	609	246,618
Cream Shippers										
Under 35.....	320	81	224	1,501	1,539	1,050	1,186	2,529	16	8,447
35 to 54.....	1,684	457	1,289	7,546	9,424	6,682	6,653	11,773	161	45,669
55 to 59.....	449	151	406	1,894	2,490	1,551	1,403	2,417	25	10,786
60 to 64.....	367	144	269	1,220	1,736	983	882	1,559	29	7,189
65 and over.....	377	192	256	927	1,606	706	588	1,066	21	5,738
Total.....	3,197	1,025	2,444	13,088	16,795	10,972	10,712	19,344	252	77,829
Milk and Cream Shippers										
Under 35.....	545	107	273	27,266	16,454	1,525	1,190	3,657	132	51,149
35 to 54.....	2,668	642	1,713	90,005	63,676	8,510	6,683	16,453	522	190,872
55 to 59.....	755	218	515	16,997	13,346	1,803	1,407	3,114	61	38,216
60 to 64.....	530	178	349	10,306	9,076	1,102	885	2,032	92	24,552
65 and over.....	565	221	319	7,093	8,581	852	590	1,383	54	19,659
Total.....	5,063	1,366	3,169	151,667	111,133	13,793	10,755	26,639	861	324,448
Percentage of Shipment										
Milk Shippers										
Under 35.....	12	8	7	19	16	17	9	15	19	17
35 to 54.....	53	54	59	60	58	65	70	64	59	59
55 to 59.....	16	20	15	11	12	9	11	10	6	11
60 to 64.....	9	10	11	7	8	4	7	6	10	7
65 and over.....	10	8	9	4	7	5	4	4	5	6
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Under 35.....	10	8	9	11	9	10	11	13	6	11
35 to 54.....	53	45	53	58	56	61	62	61	64	59
55 to 59.....	14	15	17	14	15	14	13	12	10	14
60 to 64.....	11	14	11	9	10	9	8	8	12	9
65 and over.....	12	19	10	7	10	6	5	6	8	7
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Under 35.....	11	8	9	18	15	11	11	14	15	16
35 to 54.....	53	47	54	59	57	62	62	62	61	59
55 to 59.....	15	16	16	11	12	13	13	12	7	12
60 to 64.....	10	13	11	7	8	8	8	8	11	8
65 and over.....	11	16	10	5	8	6	5	5	6	6
Total.....	100	100	100	100	100	100	100	100	100	100

shippers and the latter had relatively more old producers than the former.

With only a few exceptions, the average shipment of butterfat per manufacturing milk producer varied inversely with the age of the applicants (Table 15). The older the applicants, the smaller were the average shipments per producer. In the case of cream producers, applicants in the age group between 35 and 54 years of age made the highest average ship-

ment, and the group under 35 years old had the next highest shipment. Of the three age groups above 55 years, an inverse relationship prevailed between the average age and the average shipment.

Of the total amount of butterfat shipped, about 87 per cent was delivered by producers less than 60 years old (Table 14). There were no significant differences between milk and cream producers or among the regions.

TABLE 15—AVERAGE SHIPMENT OF MANUFACTURING MILK AND CREAM IN 1968-69 PER 1969 QUOTA APPLICANT, GROUPED ACCORDING TO AGE OF APPLICANTS, CANADA AND PROVINCES

	Average Shipment per Producer									
Age	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	pounds of butterfat									
Milk Shippers										
Under 35.....	2,741	2,326	2,350	4,689	6,547	4,318	3,636	5,221	8,297	5,190
35 to 54.....	2,912	2,986	3,214	4,284	6,159	4,448	3,019	5,404	5,224	4,849
55 to 59.....	2,906	2,558	2,863	3,538	5,102	3,320	2,302	4,440	3,303	4,027
60 to 64.....	2,072	2,900	2,345	3,269	4,663	3,316	2,970	4,303	4,211	3,742
65 and over.....	2,420	2,413	2,518	2,930	4,228	3,743	1,518	4,285	3,351	3,486
Total.....	2,737	2,772	2,900	4,088	5,739	4,198	2,865	5,127	5,123	4,599
Cream Shippers										
Under 35.....	1,721	1,733	1,763	1,889	2,205	1,451	1,090	1,736	1,211	1,645
35 to 54.....	1,993	1,415	1,803	1,857	2,303	1,487	1,163	1,744	1,346	1,684
55 to 59.....	1,749	1,029	1,598	1,634	1,973	1,320	1,130	1,616	824	1,536
60 to 64.....	1,682	1,178	1,380	1,521	1,745	1,270	1,032	1,498	1,454	1,432
65 and over.....	1,427	1,030	1,244	1,413	1,562	1,187	1,032	1,470	1,092	1,350
Total.....	1,806	1,242	1,633	1,751	2,080	1,414	1,131	1,686	1,247	1,603
Milk and Cream Shippers										
Under 35.....	2,162	1,878	1,924	4,486	5,727	1,872	1,092	2,226	5,073	3,942
35 to 54.....	2,332	1,764	2,079	4,035	5,065	1,764	1,167	2,193	2,884	3,443
55 to 59.....	2,150	1,370	1,781	3,290	4,016	1,459	1,132	1,897	1,489	2,843
60 to 64.....	1,841	1,373	1,586	3,015	3,593	1,371	1,034	1,775	2,713	2,606
65 and over.....	1,683	1,125	1,394	2,675	3,253	1,361	1,033	1,741	1,871	2,436
Total.....	2,136	1,508	1,860	3,828	4,645	1,661	1,134	2,093	2,770	3,266
	Index of Average Shipment									
	average of all applicants = 100									
Milk Shippers										
Under 35.....	100	84	81	115	114	103	127	102	162	113
35 to 54.....	106	108	111	105	107	106	105	105	102	105
55 to 59.....	106	92	99	86	89	79	80	87	64	88
60 to 64.....	76	105	81	80	81	79	104	84	82	81
65 and over.....	88	87	87	72	74	89	53	84	65	76
Total.....	100	100	100	100	100	100	100	100	100	100
Cream Shippers										
Under 35.....	95	140	108	108	106	103	96	103	97	103
35 to 54.....	110	114	110	106	111	105	103	103	108	105
55 to 59.....	97	83	98	93	95	93	100	96	66	96
60 to 64.....	93	95	84	87	84	90	91	89	117	89
65 and over.....	79	83	76	81	75	84	91	87	88	84
Total.....	100	100	100	100	100	100	100	100	100	100
Milk and Cream Shippers										
Under 35.....	101	124	103	117	123	113	96	106	183	121
35 to 54.....	109	117	112	105	109	106	103	105	104	105
55 to 59.....	101	91	96	86	87	88	100	91	54	87
60 to 64.....	86	91	85	79	77	82	91	85	98	80
65 and over.....	79	75	75	70	70	82	91	83	68	75
Total.....	100	100	100	100	100	100	100	100	100	100

SUMMARY

Almost half of the manufacturing milk and cream producers who applied for quotas in 1969-70 indicated that they intended to increase their cow numbers. Two per cent indicated that they intended to reduce their herd size. It was the larger-scale producers who intended to keep more cows. A much higher proportion of milk shippers than cream shippers had plans to increase cow numbers. A larger proportion of manufacturing milk shippers than cream shippers received more than 70 per cent of their farm cash receipts from dairy products. As the percentage of cash receipts from dairy sales increased, the average shipment of butterfat per producer (for both milk and cream producers) also increased.

The average quantity of butterfat shipped also showed a positive relationship to the amount of cultivated acreage per farm, implying that the crop and dairy operations on farms were complementary, not conflicting.

More than 80 per cent of the milk-and cream-shipping applicants had no off-farm employment. A majority of those who had off-farm employment worked for from 10 to 12 months in 1968-69. Applicants with no off-farm employment shipped more butterfat per producer than those with off-farm employment. Compared with the 1966 mail survey, the proportion of shippers with off-farm employment decreased in Canada.

Although the number of manufacturing milk and cream shippers participating in the federal subsidy program decreased by about 30 per cent from 1966 to 1969, there was little change in the age composition of the shippers. The average age of dairy shippers in Canada in both 1966 and 1969 was 48 years. Applicants from the Maritime Provinces had a higher

average age than their counterparts in other provinces. A relatively higher proportion of the producers under 35 years old were milk shippers than were cream shippers.

For milk-shipping applicants, there was an inverse relationship between the age of shippers and the average butterfat shipment. The older the shippers, the smaller was the average shipment per producer. There was no consistent relationship between the age of shippers and the average shipment of cream.

NOTES AND REFERENCES

- (1) Gratitude is due to Dr. H. J. Mestern of the Canadian Dairy Commission for his technical guidance and for the data made available.
- (2) Not all applicants considered in this study answered the questions about farm cash receipts, cultivated acreage, off-farm employment and age. Therefore the analysis of the data in each of these four sections includes only those applicants who replied. (All applicants considered in the study answered the questions on changes in herd size.) The number of applicants who replied to each question is stated at the beginning of the section in which that question is discussed.
- (3) About 6,500 of the 106,686 applications received were from fluid milk producers who also shipped some manufacturing milk and cream. These applicants were excluded from this analysis. Only the 100,109 applicants who shipped only manufacturing milk and/or cream were considered in this study.
- (4) This estimate of 114,400 registered producers of manufacturing milk and cream includes both quota holders and the other registered producers who had no quotas in 1969-70 but continued to ship manufacturing milk and cream.
- (5) Yang, W. Y., "Changes in Producers' Shipments of Manufacturing Milk and Cream under the Operation of the Canadian Dairy Commission", *Canadian Farm Economics*, Volume 5, Number 1, April 1970, Economics Branch, Canada Department of Agriculture.
- (6) White, W. J. and V. A. Heighton, *The Structure of the Canadian Manufacturing Milk Industry*, Economics Branch, Canada Department of Agriculture, Pub. No. 68/6, March 1968.

A REVIEW OF FARM CREDIT AND FARM INCOME RELATIONSHIPS

R. S. Rust

Farm credit has been and will continue to be an important factor in agricultural adjustment. As farmers retire or seek other occupations, many of them find it essential to take their capital out of agriculture. The capital thus removed from the industry is, to a large extent, replaced by credit. Credit is also used as a replacement for other resources, especially in the substitution of labor with labor-saving machinery and equipment.

One of the most frequent observations made concerning agricultural adjustment pertains to the need for a more rapid increase in the size of commercial farms. It is recognized that growth in the size of farm businesses is necessary to increase farm incomes and to bring average farm incomes up to average national income levels. However, because of the existing farm receipt-expense squeeze per unit of production, yearly growth is necessary just to maintain the relative farm income position. From 1960 to 1968, farm expenditures increased at an average rate of eight per cent a year, and farm receipts increased at an average rate of seven per cent a year (Table 1). If a slightly longer period is considered, such as from 1958 to 1968, the annual rate of increase in farm expenditures

remains the same but the increase in farm receipts is only 5.6 per cent a year. A similar situation occurs if farm receipts for 1969 are included. In spite of low farm income, relative to national income levels, the amount of credit extended each year increased from the equivalent of approximately 90 per cent of realized net farm income in 1960 to 137 per cent of income in 1968. Although an increasing proportion of this credit was used for farm business expansion, a relatively low return to investment was evident from most sample surveys of farms during the period. Average returns on larger-than-average farms varied from two to six per cent of capital investment, with the highest return being in 1966.

On a per farm basis, for the period 1960-69, farm expenditures increased by 12.5 per cent a year while farm receipts increased by 11.3 per cent a year (Table 2). In spite of an average annual increase of nine per cent in realized net farm income from 1960, the average realized net farm income per farm in 1968, was only \$3,896. Although the amount of credit extended to farmers is a much better reflector of current agricultural conditions than farm debt, the fact that credit is becoming an integral part of farm business opera-

TABLE 1—ESTIMATED NUMBER OF FARMS, FARM RECEIPTS, FARM EXPENSES, NET FARM INCOME, REALIZED NET FARM INCOME, FARM CREDIT EXTENDED, FARM CREDIT OUTSTANDING AND AVERAGE ANNUAL CHANGES, CANADA, 1960 TO 1968

Year	Number of farms	Farm receipts ^a	Farm expenses ^a	Net farm income ^a	Realized net farm income ^a	Farm credit extended ^b	Farm credit outstanding ^b
	number						
				millions of dollars			
1960.....	497,822	2,812	2,036	1,196	1,128	1,030	1,585
1961.....	479,125	2,924	2,082	922	1,195	1,150	1,785
1962.....	469,058	3,182	2,207	1,526	1,332	1,288	2,018
1963.....	458,991	3,215	2,362	1,521	1,219	1,461	2,298
1964.....	448,924	3,504	2,509	1,292	1,378	1,642	2,613
1965.....	438,857	3,819	2,712	1,567	1,519	1,863	3,004
1966.....	428,794	4,295	2,995	1,948	1,742	2,022	3,444
1967.....	418,727	4,386	3,217	1,497	1,649	2,270	3,951
1968.....	408,660	4,393	3,338	1,797	1,592	2,177	4,105
Average annual change				per cent			
1960 to 1968.....	-2.2	+7.0	+8.0	+6.3	+5.1	+13.9	+19.9

^a Excludes Newfoundland, Yukon and Northwest Territories.

^b Includes all of Canada.

Source: Data on receipts, expenses and income were taken from *Farm Cash Receipts*, Cat. No. 21-201, and *Farm Net Income*, Cat. No. 21-202, Dominion Bureau of Statistics.

TABLE 2—ESTIMATED NUMBER OF FARMS, AVERAGE FARM RECEIPTS, EXPENSES, NET INCOME, REALIZED NET INCOME, CREDIT, CREDIT USED AND DEBT, CANADA, 1960 TO 1968

Year	Number of farms ^a	Average farm receipts ^a	Average farm expenses ^a	Average net income ^a	Average realized farm income ^a	Average farm credit received ^b	Average farm debt ^b
	number			dollars per farm			
1960.....	497,822	5,649	4,090	2,402	2,266	2,061	3,172
1961.....	479,125	6,103	4,345	1,924	2,494	2,391	3,712
1962.....	469,058	6,784	4,705	3,253	2,840	2,736	4,286
1963.....	458,991	7,004	5,141	3,314	2,656	3,171	4,988
1964.....	448,924	7,805	5,589	2,878	3,070	3,643	5,798
1965.....	438,857	8,702	6,180	3,571	3,461	4,228	6,818
1966.....	428,794	10,016	6,985	4,543	4,062	4,697	8,000
1967.....	418,727	10,475	7,683	3,575	3,938	5,399	9,397
1968.....	408,660	10,750	8,168	4,397	3,896	5,305	10,003
Average annual change				per cent			
1960 to 1968.....	-2.2	+11.3	+12.5	+10.4	+9.0	+19.7	+26.9

^a Excludes Newfoundland, Yukon and Northwest Territories.

^b Averages based on estimated total number of farms in Canada.

tions makes it increasingly difficult to discern adverse conditions from credit data. The average amount of credit extended per farm increased from \$2,061 in 1960 to \$5,399 in 1967, and then decreased slightly to \$5,305 in 1968. Average farm debts, however, increased steadily from \$3,172 per farm in 1960 to \$10,003 per farm in 1968.

Late in 1967, it became apparent that the policies and programs of some suppliers of agricultural credit were beginning to change and that, as a result, the amount of credit used by farmers would level off or decrease in 1968. Higher interest rates, a strong demand for credit by non-agricultural sectors and better prospects of profits in the non-agricultural fields were some of the reasons given by various credit suppliers for re-assessing the situation. Adverse economic conditions also made many farmers reluctant to increase their indebtedness. As interest rates continued to increase during 1968, farmers experienced increased difficulty in obtaining some forms of credit. Farm Improvement Loans were drastically decreased because the mandatory five per cent interest rate was unprofitable to banks. Although \$203.7 million was lent under this program in 1967, the amount lent decreased to \$40.2 million in 1968. The curtailment of these loans increased the demand by farmers for other bank loans and for loans from other sources. The establishment, late in 1968, of interest rates closely related to commercial rates on all loans made by federal government farm credit agencies and on Farm Improvement Loans, together with the freeing of interest rates on other bank loans, helped to increase the amount of credit available, but at a higher

cost. The significant increases in interest rates, the temporary slow-down in Farm Improvement Loans and credit policies of suppliers resulted in greater use of short-term credit in 1968.

The amount of credit extended to farmers increased by 111 per cent from 1960 to the end of 1968. Of the \$1,030.4 million of credit extended in 1960, 11.9 per cent was long-term, 21.3 per cent was intermediate-term and 66.8 per cent was short-term (Table 3). Comparable data for 1967 are 16.7, 22.2 and 61.1 per cent respectively. Of the \$2,177.2 million extended in 1968, the distribution was 14.5, 14.4 and 71.1 per cent respectively. With Farm Improvement Loans estimated to have increased by about \$100 million in 1969 and possibly by another \$50 million in 1970, the proportion of loans in the intermediate-term range is expected to be slightly higher than in 1968. However, bank loans to farmers (both Farm Improvement Loans and other loans) are expected to have relatively short repayment periods in the foreseeable future. There is currently little evidence that the 1960-68 average growth rate in farm business size was maintained in 1969, or that it will be maintained in 1970. This implies that the use of credit will likely level off or continue to decrease slightly, and also implies that the gap between the average incomes in agriculture and those in other industries will likely widen. Although the leasing of land, instead of using credit to purchase land, is an alternative method of increasing the growth of farm businesses, the returns to lessors are not favorable enough to bring about a significant increase in leasing.

TABLE 3—ESTIMATED FARM CREDIT EXTENDED, CANADA, 1960 TO 1968

Source and term of credit	Estimated farm credit extended						Estimated average interest rate	Percentage of credit extended by source 1988			
	1960	1961	1962	1963	1964	1965			1966	1967	1968
millions of dollars											
per cent											
LONG-TERM (more than 10 years)											
Farm Credit Corporation.....	52.3	68.9	78.4	96.3	139.8	201.7	234.4	251.2	205.3	7.75	9.4
Veterans' Land Act.....	19.4	15.2	15.7	18.2	15.9	21.1	33.6	31.3	20.1	7.75	.9
Provincial government agencies....	37.0	38.1	39.0	40.4	49.4	47.8	51.4	63.6	60.4	4.00	2.8
Private individuals.....	7.0	8.0	8.0	9.0	10.0	11.0	12.0	16.0	15.0	7.00	.7
Insurance, trust and loan companies..	3.0	4.0	5.0	6.0	7.0	8.0	10.0	13.0	13.0	9.00	.6
Treasury Branches (Alberta).....	1.6	1.6	1.4	1.2	.3	.6	.8	1.4	1.0	8.75	.b
Railway and land companies.....	.4	.4	.2	—	—	—	—	—	—	—	—
Albertha Electrical Co-operatives ^a .	2.0	2.0	2.0	2.0	2.0	2.4	2.0	2.0	3.50	.1	—
Total long-term.....	122.7	138.2	149.7	173.1	224.4	292.6	344.2	378.5	316.8	7.03	14.5
INTERMEDIATE-TERM (18 months to 10 years)											
Banks (Farm Improvement Loans)	101.9	108.1	118.1	136.0	150.8	202.7	212.8	203.7	40.2	6.00	1.9
Private individuals.....	75.0	78.0	79.0	85.0	95.0	108.0	120.0	134.0	130.0	7.00	6.0
Supply companies.....	29.0	27.0	28.0	30.0	32.0	34.0	38.0	43.0	35.0	14.00	1.6
Farm Credit Corporation (loans to farm syndicates)..	—	—	—	—	—	.9	1.0	1.0	1.7	7.50	1
Insurance, trust and loan companies.	.5	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	9.50	.2
Industrial Development Bank.....	—	.2	.4	4.8	5.9	7.1	6.9	6.1	8.4	8.50	.4
Credit Unions.....	4.0	7.0	20.0	37.0	51.0	61.0	74.0	90.0	70.0	9.60	3.2
Municipalities (Ontario Tile Drainage Act).....	1.0	1.3	1.4	1.6	1.9	1.8	2.1	2.6	4.3	4.00	.2
Finance companies (cars and trucks).....	8.0	9.0	11.0	12.0	14.0	15.0	15.0	16.0	15.0	14.50	.7
Treasury Branches (Alberta).....	.3	.3	.4	.2	.3	1.7	2.3	2.7	2.3	8.50	.1
Sedco (Saskatchewan) ^b	—	—	—	—	.4	.5	.3	.0	.6	8.50	.b
Total intermediate-term.....	219.7	231.9	260.3	308.6	354.3	435.7	476.4	504.1	312.5	8.65	14.4
SHORT-TERM (up to 18 months)											
Banks (other than Farm Improvement Loans).....	302.0	363.0	428.0	491.0	541.0	574.0	618.0	733.0	895.0	8.75	41.1
Supply companies.....	237.0	245.0	256.0	271.0	287.0	307.0	311.0	348.0	300.0	16.00	13.8
Credit Unions.....	55.0	68.0	80.0	95.0	106.0	119.0	131.0	150.0	187.0 ^c	10.50	8.6
Finance companies (household and personal).....	6.0	8.0	9.0	10.0	12.0	13.0	14.0	15.0	12.0	18.00	.6
Dealers, stores, etc.,.....	25.0	24.0	22.5	21.0	19.5	18.0	19.5	15.0	14.0	7.00	.6
Private individuals.....	55.0	62.0	71.0	77.0	85.0	90.0	95.0	110.0	105.0	7.00	4.8
Treasury Branches (Alberta).....	8.0	9.5	12.0	14.2	12.5	13.5	12.6	16.4	17.1	8.75	.8
Co-operative programs ^d	—	—	—	—	—	—	—	—	17.8	10.00	.8
Total short-term.....	688.0	779.5	878.5	979.2	1,063.0	1,134.5	1,201.1	1,387.4	1,547.9	10.32	71.1
Total all credit.....	1,030.4	1,149.6	1,288.5	1,460.9	1,641.7	1,862.8	2,021.7	2,270.0	2,177.2	9.60	100.0

Saskatchewan Wheat Pool. Manitoba Pool Elevators and other co-operative programs.

TABLE 4—ESTIMATED FARM CREDIT OUTSTANDING, CANADA, 1960 TO 1968

Source and term of credit	Estimated farm credit outstanding							Estimated interest charges 1968	Estimated average interest rate 1968	Percentage of credit outstanding by source 1968		
	1960	1961	1962	1963	1964	1965	1966				1967	1968
	millions of dollars									per cent		
LONG-TERM (more than 10 years)												
Farm Credit Corporation.....	158.4	212.1	270.3	341.2	443.6	586.4	748.5	915.8	1,036.1	54.9	5.3	25.2
Veterans' Land Act.....	91.2	96.6	102.8	110.8	114.6	124.4	147.3	172.3	180.4	9.2	5.1	4.4
Provincial government agencies.....	160.0	182.7	204.0	228.3	254.0	275.9	302.2	332.3	351.7	13.7	3.9	8.6
Private individuals.....	31.0	33.0	34.0	36.0	40.0	45.0	61.0	65.0	67.0	3.5	5.2	1.6
Insurance, trust and loan companies.....	12.0	15.0	19.0	25.0	30.0	38.0	50.0	56.0	60.0	5.0	8.4	1.5
Treasury Branches (Alberta).....	1.2	1.3	1.3	1.3	.9	1.3	.7	1.5	1.4	.1	7.7	b
Railway and land companies.....	1.6	1.3	.9	.6	.1	—	—	—	—	—	—	—
Alberta Electrical Co-operatives.....	19.7	19.7	19.9	19.7	19.5	18.8	17.8	17.2	16.8	.6	3.5	.4
Total long-term.....	475.1	561.7	652.2	762.9	902.7	1,089.8	1,327.5	1,560.1	1,713.4	87.0	5.1	41.7
INTERMEDIATE-TERM (18 months to 10 years)												
Banks (Farm Improvement Loans).....	178.1	193.8	212.6	241.3	273.1	340.9	399.1	432.6	308.5	16.0	5.2	7.5
Private individuals.....	300.0	312.0	319.0	342.0	382.0	432.0	483.0	538.0	510.0	28.6	5.6	12.4
Supply companies.....	78.0	81.0	85.0	91.0	96.0	104.0	116.0	131.0	120.0	14.4	12.0	2.9
Farm Credit Corporation (loans to farm syndicates).....	—	—	—	—	—	.9	1.6	2.2	3.4	.2	6.5	.1
Insurance, trust and loan companies.....	4.0	5.0	7.0	7.0	10.0	12.0	16.0	19.0	20.0	1.8	8.9	.5
Industrial Development Bank.....	—	.2	4.2	8.0	12.0	18.0	20.0	22.0	23.0	1.8	8.0	.5
Credit Unions.....	5.0	15.0	37.0	61.0	84.0	91.0	103.0	120.0	125.0	11.6	9.3	3.0
Municipalities (Ontario Tile Drainage Act).....	4.2	4.9	5.6	6.4	7.4	8.1	9.0	10.2	12.9	.5	4.0	.3
Finance companies (cars and trucks).....	10.0	12.0	14.0	16.0	18.0	20.0	20.0	23.0	21.0	3.0	14.5	.5
Treasury Branches (Alberta).....	.4	.6	.4	.2	.3	1.7	1.4	2.8	3.9	.3	8.5	.1
Sedco (Saskatchewan).....	—	—	—	—	—	.4	.7	1.5	1.7	.1	8.5	.1
Total intermediate-term.....	579.7	624.5	684.8	772.9	882.8	1,029.0	1,169.8	1,302.3	1,149.4	78.3	6.8	28.0
SHORT-TERM (up to 18 months)												
Banks (other than Farm Improvement Loans).....	241.5	290.7	343.4	392.7	433.0	459.5	494.7	586.6	716.0	62.3	8.7	17.5
Supply companies.....	178.0	184.0	192.0	203.0	215.0	230.0	243.0	261.0	242.0	38.7	16.0	5.9
Credit Unions.....	45.0	52.0	64.0	76.0	85.0	95.0	105.0	120.0	150.0	15.8	10.5	3.7
Finance companies (household and personal).....	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	10.0	1.8	18.0	.2
Dealers, stores, etc.....	8.5	8.0	7.5	7.0	6.5	6.0	5.5	5.0	5.0	.4	7.0	.1
Private individuals.....	44.0	50.0	57.0	63.0	68.0	72.0	76.0	88.0	90.0	6.3	7.0	2.2
Treasury Branches (Alberta).....	6.0	6.3	8.0	10.1	9.3	11.0	9.6	13.5	13.7	1.2	8.7	.3
Co-operative programs ^a	—	—	—	—	—	—	—	—	12.3	1.2	10.0	.3
Unpaid taxes.....	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	3.0	.3	8.5	.1
Total short-term.....	529.8	589.9	680.8	761.8	827.8	885.6	946.9	1,088.3	1,242.0	128.0	10.3	30.3
Total all credit.....	1,584.6	1,785.1	2,017.8	2,297.6	2,613.3	3,004.4	3,444.2	3,950.7	4,104.8	293.3	7.1	100.0

— = none reported.

^a Previously unreported credit extended to farmers.^b Less than .1 per cent.^c Greatly increased because of previous lack of reporting of credit extended to farmers for personal purposes.^d Saskatchewan Wheat Pool, Manitoba Pool Elevators and other co-operative programs.

TABLE 5—THE RATIO OF FARM DEBT TO FARM INVESTMENT, CANADA, 1960 TO 1968

Year	Farm debt	Investment in farm real estate, machinery and livestock ^a	Debt as a percentage of investment	Estimated total investment of farmers ^b	Debt as a percentage of total investment
		millions of dollars	per cent	millions of dollars	per cent
1960.....	1,584.6	12,680.0	12.5	14,088.9	11.2
1961.....	1,785.1	13,159.2	13.6	14,621.3	12.2
1962.....	2,017.8	13,669.7	14.8	15,188.6	13.3
1963.....	2,297.6	14,508.5	15.8	16,120.6	14.2
1964.....	2,613.3	15,744.1	16.6	17,493.4	14.9
1965.....	3,004.4	17,217.8	17.4	19,130.9	15.7
1966.....	3,444.2	19,062.7	18.1	21,180.8	16.3
1967.....	3,950.7	20,951.6	18.8	23,279.6	17.0
1968.....	4,104.8	22,378.4	18.3	24,864.9	16.5

^a Source: *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

^b Ninety per cent of total investment is estimated to be in farm real estate, machinery, equipment and livestock, and ten per cent in other investments.

The amount of farm credit outstanding increased from \$1,584.6 million in 1960 to \$4,104.8 million in 1968 (Table 4). However, the rate of increase between 1967 and 1968 was smaller than in previous years. Mainly as a result of credit obtained for land purchases, long-term debt increased from 30 per cent of the total debt in 1960 to almost 42 per cent in 1968. The interest charges on farm debt in 1968 have been estimated at \$293 million. This represents a considerable increase from the estimates made for 1967 (1). The difference is accounted for by three factors: the inclusion of previously unreported credit, increased interest rates, and greater use of shorter-term credit where interest rates reflect both current interest rate changes and greater risks in lending.

The ratio of farm debt to farm investment decreased from 1967 to 1968, the first decrease since 1960. Farm debts at the end of 1968 are estimated to have been 16.5 per cent of total farm investment or 18.3 per cent of investment in farm real estate, machinery, equipment, livestock and poultry (Table 5). In the United States, the annual increase in farm debt averaged more than \$4 billion from 1965 to 1968. Increases in aggregate farm debt in that country have been four-fold since 1950, while assets more than doubled during the period. In 1960, the debt-asset ratio in the United States was 12.2 per cent; in 1965, 15.8 per cent; and in 1968, 17.8 per cent. Comparable data for 1960, 1965 and 1968 in Canada are 11.2 per cent, 15.7 per cent and 16.5 per cent respectively. Although the farm debt-asset ratios do not appear unduly high in either Canada or the United States, the averages are somewhat misleading since many small farms do not have any

significant debts. The debt-asset ratio of farmers having debts, young farmers in particular, is much higher than the average.

Trends in the use of agricultural credit in Canada for the 1970's are much more difficult to predict than they were for the 1960's. The use of credit has become an integral part of the normal business operations on many of the larger farms. The need for steady business expansion is also well recognized by the owners of the larger farm businesses. The need for agricultural adjustments toward fewer and larger farms to provide satisfactory farm incomes and returns to investment is becoming increasingly recognized by farmers, non-farmers and by governments. Under such circumstances, it might be assumed that the amount of credit used by farmers would steadily increase.

Leasing, instead of purchasing land, is often suggested as a means of reducing a farmer's investment in land and at the same time making more capital available for production purposes. In the short run, the demand for leased land for grain production may decrease but at the same time, the demand for leased land for grazing purposes will increase. In the long run, because of narrowing profit margins, farms must increase in size and in view of increasing credit costs, this implies an increased demand for leased land. The returns to investment in agriculture compared with returns from other industries, the returns to the lessor's investment, and the lessor's need for capital, both for re-establishment and for income, are all such that there is likely to be little permanent increase in the supply of land for leasing. Although the implementa-

tion of a capital gains tax may induce some retiring farmers to rent their land, the capital requirements of those who quit farming are likely to increase rather than decrease, and this will tend to decrease the amount of land offered for rental purposes.

Narrowing margins between farm receipts and farm expenses, lower prices and a slackening of market demand coupled with an over-supply of some farm products, higher interest rates on credit, and the prospect of a capital gains tax on increases in the value of farm real estate all suggest that the amount of credit will likely level off close to the 1968 level and that growth in the size of farms during 1970 and 1971 will likely be less than the 1960-68 average growth rate. The 1971 census will probably indicate that a

significant increase in farm size occurred between 1966 and 1971, but the largest proportion of this increase will be the result of the increases that occurred between 1966 and 1969. The decreasing number of small farms without debts and eventually, a larger number of farms with capital investments of more than \$100,000 per farm should offset some of the above factors, and as economic conditions in agriculture improve, result in an increase in the demand for credit.

REFERENCES

- (1) Rust, R. S., "Farm Credit Reviewed", *Canadian Farm Economics*, Volume 3, Number 4, October 1968, Economics Branch, Canada Department of Agriculture.

POLICY AND PROGRAM DEVELOPMENTS

Interim Sugar Beet Deficiency Payment—The Agricultural Stabilization Board is authorized to make an interim deficiency payment of \$1.50 a standard ton to growers in Manitoba and Alberta for their 1969 sugar beet crop. (A standard ton is the amount of sugar beets needed to produce 250 pounds of refined sugar.) The support level for 1969 sugar beets was \$15.98 a standard ton. (March 13, 1970)

Federal Dairy Policy—From April 1, 1970 to March 31, 1971, the Canadian Dairy Commission (CDC) support prices for manufactured dairy products are: 65 cents a pound for butter, 20 cents a pound for skim milk powder and 46.5 cents and 47 cents a pound for cheddar cheese, depending on the season in which it was made.

In addition to these price supports, the Canadian Dairy Commission pays a subsidy to producers with CDC quotas. In 1970-71, the subsidy is 35.71 cents a pound for butterfat delivered as either manufacturing milk or cream.

Part of the subsidy payment is held back by the CDC to be used to help pay for the disposal of surplus dairy products. For milk deliveries up to quota levels, the holdback is 26 cents a hundredweight of milk: for cream deliveries, the rate is one cent a pound of butterfat. The holdback on deliveries in excess of quota levels is \$1.25 a hundredweight for milk and eight cents a pound of butterfat for cream. (March 23, 1970)

Agricultural Products Co-operative Marketing Act Amendment—An amendment to this Act changed the

definition of an agricultural product, as it applies to this Act, so that wheat grown in areas outside the Canadian Wheat Board's jurisdiction could be included under the provisions of the Act. (March 25, 1970)

Ontario Bean Producers' Marketing Board Interim Payment—By the terms of an agreement under the Agricultural Products Co-operative Marketing Act, the Ontario Bean Producers' Marketing Board is authorized to make interim deficiency payments to producers of 80 cents a hundredweight for pea beans and \$5.00 a hundredweight for yellow-eye beans, delivered to the Board for marketing during 1969. Details of the agreement are explained in "Policy and Program Developments", *Canadian Farm Economics*, Volume 4, Number 4, October 1969. (April 7, 1970)

Manufacturing Milk and Cream Price Stabilization Order—From April 1, 1970 to March 31, 1971, the price of manufacturing milk and cream will be supported at \$4.85 a hundredweight of milk (3.5 per cent butterfat) or the equivalent in cream. This support level is 158 per cent of the established base price.

The support program is administered by the Canadian Dairy Commission with funds from the Agricultural Stabilization Board. (April 28, 1970)

1970 Sugar Beet Support Price—The Agricultural Stabilization Board will support the price of the 1970 sugar beet crop at a national average level of \$15.98 a standard ton for beets delivered to processing plants. (May 11, 1970)

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Marketing Boards in Canada, 1968, National Summary, K. Cann, Economics Branch, Canada Department of Agriculture, Ottawa, January 1970, Pub. No. 70/2, pp. 9.

This is the twelfth annual report on the activities of producer marketing boards and industry marketing commissions.

Organizational Characteristics of Grain-Cattle-Hog Farms in the Prairie Provinces, 1956-1965, T. F. Joyce, Economics Branch, Canada Department of Agriculture, Regina, April 1970, Pub. No. 70/3, pp. iii + 38.

This report contains a summary of production and financial data from a sample of grain-cattle-hog farms in the Prairie Provinces. The data were collected as part of a series of studies on farm organization from 1956 to 1965.

Provincial Agricultural Legislation in Western Canada, 1969 Supplement, T. F. Joyce, Economics Branch, Canada Department of Agriculture, Ottawa, March 1970, Pub. No. 70/4, pp. iii + 157 to 176.

This supplement to **Provincial Agricultural Legislation, Western Canada, 1966** contains a summary of the agricultural legislation passed in 1969 by the Legislatures of the four western provinces.

UNITED NATIONS PUBLICATIONS

Available in Canada from the Queen's Printer, Ottawa

Incentives and Disincentives for Farmers in Developing Countries, Agricultural Planning Study Number 8, Food and Agriculture Organization of the United Nations, Rome, 1967, pp. iv + 43.

In this report is an analysis of the economic and institutional obstacles that inhibit farmers in developing countries from producing enough to meet consumer demand. Policies and programs designed to give farmers the incentive to adopt improved methods and to increase production are also reviewed.

Introduction to Agricultural Planning, Agricultural Planning Study Number 12, Food and Agriculture Organization of the United Nations, Rome, 1970, pp. v + 118.

The guidelines to be used in effective planning for agriculture are described in the publication. The implementation and evaluation of agricultural plans are also discussed.

Manual on Food and Nutrition Policy, FAO Nutritional Study Number 22, Food and Agriculture Organization of the United Nations, Rome, 1969, pp. viii + 95.

The purpose of this manual is to define food and nutrition policy in the context of economic and social development and to describe the programs needed to put this policy into effect.

Agricultural Education and Training, Annual Review of Selected Developments, Food and Agriculture Organization of the United Nations, Rome, 1967, pp. i + 63.

Ten articles on various aspects of agricultural education in developing countries are published in this first issue of the **Annual Review of Selected Developments in Agricultural Education and Training**.

Demand Interrelationships Between Major Fruits, Commodity Policy Study Number 19, Food and Agriculture Organization of the United Nations, Rome, 1969, pp. v + 26.

This is the report of a study on the interrelationship between the demand for dessert apples, oranges and bananas in the six principal fruit-consuming markets, Canada, the United States, the Netherlands, the Federal Republic of Germany, the United Kingdom and France. The time period studied was from October 1955 to September 1966.

OTHER PUBLICATIONS

Not available from the Economics Branch

Canadian Agriculture in the Seventies, Report of the Federal Task Force on Agriculture, Queen's Printer, Ottawa, December 1969, Cat. No. A21-15/1969, pp. xxi + 475. Price: \$7.00.

The Federal Task Force on Agriculture was appointed in April 1967 to analyze the problems of Canadian agriculture and to make recommendations to the government on agricultural policy measures which would lead to the development of a viable agricultural industry in Canada during the 1970's. This book contains the results of the Task Force studies.

The report is divided into five sections: (1) the structure of the Canadian agriculture industry; (2) commodity studies; (3) institutions in Canadian agriculture; (4) the low-income sector; and (5) recommendations of the Task Force. Included also are six appendices outlining the establishment and activities of the Task Force.

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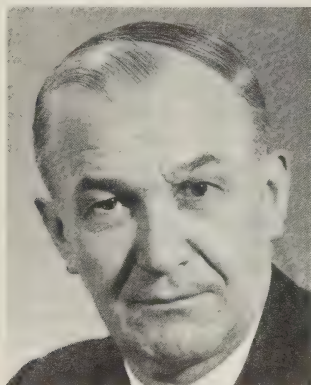
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CANADIAN FARM ECONOMICS

THE INTERMEDIATE- AND LONG-TERM MARKET OUTLOOK FOR BEEF

Z. Yankowsky



This paper first describes the importance of beef and other meat products in terms of value and quantity to Canadian consumers and in terms of farm cash receipts to Canadian producers. Then it analyses major historical trends in the demand for beef and factors related to these trends. The third part of the article describes the methods and assumptions used in projections and the projections of the demand for beef and other meats to 1980. The fourth and last part presents future cattle requirements and the implications for producers.

The analyses and projections are on a national basis and are concerned with the longer-term outlook for meat.

THE IMPORTANCE OF MEAT IN THE CANADIAN FOOD BASKET

Consumer Expenditure on Meat

In the Canadian food basket, meat has always been considered a preferred food, and beef is the most preferred of all meats.

Canadian food expenditure surveys (1) indicate that expenditure on meat is the highest of all groups of commodities in the food basket. In the mid-1950's, expenditure on meat represented almost 30 per cent of the total food basket: at the beginning of the sixties, meat expenditure was slightly more than 30

per cent of total food expenditure, and in 1970, it is estimated that expenditure on meat represents about 35 per cent of all expenditures on food.

In 1962, the Canadian consumer spent, on the average, about \$350 on food (1). Per capita expenditure on meat was about \$110. Total retail value of meat was about \$2 billion and the farmer's share was about 55 per cent, or almost \$1.1 billion.

Total expenditure on food increased considerably toward the end of the 1960's, and in 1969, was about \$9 billion. Estimated retail value of meat was almost \$3.2 billion and farm value, about \$1.7 billion in 1969. The surveys also show that, in 1955, expenditure on beef represented about one-third of the total expenditure on meat and increased to almost one-half in 1962.

Consumption of Meat

Average per capita consumption of all meat in Canada in 1967-69 was almost 200 pounds. Of that total, beef represented almost 90 pounds or about 45 per cent. Second in importance was pork which represented about 28 per cent of all meat consumed. The per capita consumption of poultry, the production of which in the past was considered a by-product of the egg industry, almost reached the level of 43 pounds. By the end of the 1970's, poultry will compete with pork for second place in the meat basket.

Farm Cash Receipts

The importance of the livestock sector can also be measured in terms of farm cash receipts. The average annual level of farm cash receipts from farming operations in 1967-69 was about \$4.3 billion and of that total, livestock and livestock products represented \$2.5 billion, or about 58 per cent. In the same period, the value of cattle and calf sales was about \$960 million, and accounted for 22 per cent of total farm product sales, or 39 per cent of all livestock and products.

ANALYSIS OF HISTORICAL TRENDS

Trends in Per Capita Consumption

During the past two decades, per capita consumption of all meat was characterized by steady growth,

increasing from 145 pounds at the beginning of the fifties, to almost 200 pounds at the end of the sixties, an increase of about 38 per cent (Table 1). The average annual increase was 2.7 pounds a year.

During the 1949-69 period, the largest absolute increase occurred in the per capita consumption of beef, from about 57 pounds to 87 pounds. Per capita consumption of poultry increased from 16 pounds to 42 pounds during the same period. This represents an average increase of five per cent a year, the largest annual increase of all meats and almost twice as large as the 2.6 per cent annual increase in beef consumption. Per capita consumption of pork reached a peak of more than 58 pounds in 1951 and fell to its lowest point of 44 pounds in 1957. Since then, pork consumption fluctuated around the 50-pound level. Only during three years in the post-war period, that is from 1950 to 1952, did the consumption of pork exceed that of beef. Other kinds of meat, that is veal, mutton and lamb, are of relatively minor importance in the meat basket and even substantial changes in the consumption of these types of meat would not affect the overall pattern of consumption. Veal consumption appears to have been declining for a number of years, and since 1965, the decline was more pronounced. On the other hand, consumption of mutton and lamb showed a very slow upward trend. Consumption of all types of canned meat and

edible offal, which amounts to slightly more than eight pounds per capita annually, remained almost unchanged for the past ten years.

Although today's meat basket consists of mainly the same kinds of meat as in 1950, the share of individual types of meat changed quite significantly (Table 2). In 1950, pork represented more than 38 per cent of the total, beef was second with 35 per cent and poultry's share was only 11 per cent. In 1969, beef's share increased to more than 43 per cent, poultry's share to 21.5 per cent and pork's share declined from 38 to 26 per cent.

Total Consumption

During the past two decades, the total increase in meat consumption was quite dramatic. Consumption increased from about 1,950 million pounds to about 4,150 million pounds, or 113 per cent.

The increase in beef consumption was even more spectacular, from 720 million pounds to 1,845 million pounds or 156 per cent. The rate of increase in pork consumption was about one-third that of beef, almost 50 per cent. During the same period, poultry consumption increased by 316 per cent, from 210 million pounds to 878 million pounds. This increase in poultry consumption must be considered separately because it was the growth of a new product

TABLE 1—PER CAPITA DISAPPEARANCE OF MEAT, CANADA, 1949 TO 1969

Year	Beef ^a	Veal ^a	Mutton and lamb ^a	Pork ^a	Offal	Canned meat	Total red meat ^a	Poultry ^b	Total all meat
	pounds								
1949	56.7	9.9	2.7	55.0	5.1	4.6	134.0	15.8	149.8
1950	50.8	9.4	2.2	55.0	4.9	5.1	127.4	16.1	143.5
1951	49.3	7.6	2.0	58.6	4.7	5.9	128.1	18.0	146.1
1952	54.4	6.9	2.2	56.0	5.2	7.5	132.2	21.7	153.9
1953	65.1	8.1	2.4	48.7	5.0	5.1	134.4	19.8	154.2
1954	70.2	8.6	2.5	45.4	4.8	4.3	135.8	21.7	157.5
1955	69.1	8.4	2.6	49.2	5.3	4.2	138.8	24.3	163.1
1956	71.4	8.5	2.6	49.2	5.2	4.9	141.8	25.6	167.4
1957	72.0	8.9	2.6	44.4	5.2	4.6	137.7	25.9	163.6
1958	68.0	7.3	2.7	49.4	4.8	5.2	137.4	27.5	164.9
1959	65.6	6.9	2.9	56.7	4.9	4.6	141.6	30.3	171.9
1960	70.0	6.9	2.9	52.6	4.8	6.4	143.6	27.7	171.3
1961	70.5	6.8	3.5	50.3	4.5	4.3	139.9	31.1	171.0
1962	71.1	7.1	3.8	50.1	4.3	4.2	140.6	31.0	171.6
1963	74.3	6.5	4.0	50.7	4.0	4.4	143.9	33.0	176.9
1964	79.4	7.2	3.4	51.8	3.9	4.5	150.2	35.0	185.2
1965	83.6	8.3	2.8	47.9	3.6	4.2	150.4	36.6	187.0
1966	84.1	7.0	3.4	46.9	3.6	4.2	149.2	39.3	188.5
1967	84.0	7.2	3.6	53.8	3.9	4.7	157.2	40.7	197.9
1968	86.7	6.4	4.2	53.6	3.8	4.7	159.4	39.7	199.1
1969	86.4	5.1	4.0	51.9	4.0	4.6	156.0	42.8	198.8

^a Cold dressed carcass weight.

^b Eviscerated weight.

Sources: *Handbook of Agricultural Statistics, Part VI*, 1966, Cat. No. 21-504 and *Canadian Livestock and Animal Products Statistics*, Cat. No. 23-203, Dominion Bureau of Statistics.

TABLE 2—SHARES OF THE TOTAL MARKET
FOR MEAT, CANADA, 1949 TO 1969

Year	Total	Beef	Veal	Mutton	Pork	Other meat	Poultry
		per cent					
1949...	100.0	37.9	6.6	1.8	36.7	6.5	10.5
1950...	100.0	35.4	6.6	1.5	38.3	7.0	11.2
1951...	100.0	33.7	5.2	1.4	40.1	7.3	12.3
1952...	100.0	35.3	4.5	1.4	36.4	8.3	14.1
1953...	100.0	42.2	5.3	1.6	31.6	6.5	12.8
1954...	100.0	44.5	5.5	1.6	28.8	5.8	13.8
1955...	100.0	42.4	5.2	1.6	30.2	5.8	14.8
1956...	100.0	42.6	5.1	1.6	29.4	6.0	15.3
1957...	100.0	44.0	5.5	1.6	27.1	6.0	15.8
1958...	100.0	41.2	4.4	1.6	30.0	6.1	16.7
1959...	100.0	38.2	4.0	1.7	33.0	5.5	17.6
1960...	100.0	40.9	4.0	1.7	30.7	6.5	16.2
1961...	100.0	41.2	4.0	2.0	29.4	5.2	18.2
1962...	100.0	41.4	4.1	2.2	29.2	5.0	18.1
1963...	100.0	42.0	3.7	2.2	28.7	4.7	18.7
1964...	100.0	42.9	3.9	1.8	28.0	4.5	18.9
1965...	100.0	44.7	4.4	1.5	25.6	4.2	19.6
1966...	100.0	44.6	3.7	1.8	24.9	4.1	20.9
1967...	100.0	42.4	3.6	1.8	27.2	4.4	20.6
1968...	100.0	43.6	3.2	2.1	26.9	4.3	19.9
1969...	100.0	43.5	2.6	2.0	26.1	4.3	21.5

caused by the application of technological innovations to the traditional production pattern.

The expansion in the total consumption of meat resulted in a considerable increase in the sale of livestock from farms. Between 1949 and 1969, total receipts from the sale of livestock increased from \$795 million to \$1,683 million or by 111.5 per cent. Cash receipts from the sale of cattle and calves increased from \$410 million to \$963 million, about 135 per cent.

Factors Related to the Historical Trends

The expansion in the domestic market for livestock products is the result of many forces. These include population growth, increased consumer buying power, technological changes, shifts in consumer preferences, changing price situations and many others. Not all of these forces act in the same direction and not all influence consumption to the same degree. Some factors influence the quantity purchased; others influence the quality; other factors affect both. For example, it is considered that population growth influences changes in quantity, but income and technology influence both quantity and quality.

The following sections will first analyze some of these factors, their trends and the apparent influences of each factor on the demand for individual livestock products. Then a multiple regression approach is applied to study the combined and simultaneous influence of these factors on the demand for meat.

Population

During the past 20 years, the Canadian population increased by 56.6 per cent, from 13.4 million to 21 million. The average annual rate of growth for the whole period was 2.3 per cent, but the growth of population was not even. Between 1949 and 1959, annual growth was 2.7 per cent and between 1959 and 1969, the growth slowed down substantially, to an average of about 1.9 per cent. At present, the average rate is about 1.7 per cent. The relative decline in population growth is already affecting, and will undoubtedly further affect, the total demand for food in general.

Income

The Canadian economy was characterized by relatively steady growth during the whole post-war period, but the growth in the 1960's was substantially greater than for the whole post-war period. Total personal disposable income, measured in constant dollars, increased from \$15.4 billion in 1949 to \$40.9 billion in 1969. The annual average compound rate of growth was about 5.1 per cent. During the same period, on per capita basis, personal disposable income increased from \$1,144 to \$1,944 or by 70 per cent. Almost all of that income was spent by the consumer on goods and services, and only five to seven per cent was put aside as savings. In relation to disposable income, expenditure on food has declined from about 23 per cent in 1952-54 to about 19 per cent in 1967-69.

Consumer Preferences

Although food is considered essential for human existence and is always placed at the top of all human needs, not all food products share an equal preference by the consumers. Consumer preferences differ from country to country, from region to region and from season to season. What makes one product more desirable than another depends on tradition, religious beliefs, established habits, environment, new information on the nutritional aspects, promotions, etc.

Under the influence of all these factors, the Canadian food basket is changing all the time, although the changing components are not easily detected and evaluated. Products that were considered unacceptable not long ago are becoming a permanent feature in our diet today, and products that are not considered today will be a part of our diet tomorrow.

In the evaluation of expenditure on meat, special consideration must be given to the growing im-

portance of the away-from-home market for food. According to Dominion Bureau of Statistics surveys (1), expenditure on food eaten away from home increased by about 34 per cent between 1955 and 1962, and this upward trend is now increasing at a faster rate than in the past.

Eating out no longer means just Sunday steak dinner in restaurants for higher income Canadians, travellers, convention participants or summer vacationers. These are very important customers, but eating out is now becoming a regular pattern of life for most Canadians. The food eaten in school, factory or office cafeterias and lunchrooms has set a pattern of eating out. In all these places, menu items range from hamburgers and wieners to steaks and other meat varieties, and the type of service varies from the self-service establishment to the full service restaurant.

A growing population, with rising incomes, and other changes in living patterns, such as urbanization, frequent camping and outside cooking, all contribute to making meats, especially steaks and other barbeque meats, more important items in our daily diet.

These innovations must be taken into account and evaluated in any estimate of future meat consumption.

Prices

Our economy has been steadily growing since 1949, and the forces that contributed to that growth contributed also to the rise in prices. In 1969, the consumer price index was about 60 per cent higher than in 1959, and the increase in the food price index was 55 per cent. However, not all food prices showed the same rate of increase.

Of all the principal meats, the price of beef increased the most from 1949 to 1969, followed by pork prices, which increased at a much slower rate. In 1969, the composite retail price of beef was almost 80 per cent higher than in 1949; the price of pork was about 50 per cent higher and the poultry price was actually 20 per cent lower than in 1949 (Table 3). However, when retail beef prices are deflated by the consumer price index, their present level is only about ten per cent higher than in 1949, while pork prices are ten per cent lower and poultry prices are about one-half what they were in 1949. In the case of beef, the increase in price is significant not only for higher-priced cuts but also for lower-priced cuts. (Sirloin steak increased by 92 per cent; prime rib roast, 76 per cent; stewing beef, 95 per cent; and hamburger, 68 per cent).

TABLE 3—RETAIL PRICE INDEX OF MEAT, CANADA, 1949 TO 1969

Year	Beef	Pork	Other Meat	Total Red Meat	Poultry	Total All Meat
1949=100						
1950.....	118.5	98.3	105.6	108.9	96.2	107.1
1951.....	149.8	111.3	134.2	133.2	113.3	130.3
1952.....	135.7	97.1	123.1	119.6	100.8	115.9
1953.....	111.3	106.8	105.7	108.7	108.6	108.6
1954.....	104.8	111.8	99.8	106.4	95.3	104.8
1955.....	106.7	98.5	95.4	101.7	93.8	100.5
1956.....	107.6	99.1	95.9	102.4	91.7	100.8
1957.....	112.0	117.1	101.1	111.8	88.1	108.3
1958.....	128.9	113.4	112.2	120.3	87.2	115.5
1959.....	137.4	105.1	114.4	121.6	79.1	115.4
1960.....	131.6	103.9	112.6	118.2	80.9	112.8
1961.....	130.7	113.3	113.7	121.3	72.7	114.3
1962.....	143.3	116.9	116.8	129.0	74.4	121.0
1963.....	139.2	117.0	119.6	127.7	76.3	120.2
1964.....	134.6	114.4	118.3	124.4	72.7	116.9
1965.....	140.2	127.6	121.3	132.2	74.8	123.9
1966.....	154.4	147.6	136.6	148.7	80.7	138.8
1967.....	162.3	133.5	137.0	147.3	77.5	137.2
1968.....	165.1	132.3	138.1	148.4	79.7	138.4
1969.....	178.7	148.0	146.2	161.7	79.4	149.8

Source: *Prices and Price Indexes*, Cat. No. 62-002, Dominion Bureau of Statistics.

Yet it would be wrong to think that there was no reaction on the part of the consumer to the rising prices. Almost every time there was a sharp increase in beef prices, per capita consumption dropped and when the price of beef decreased, consumption increased. For example, in the 1951-57 period, when beef prices were decreasing, per capita beef consumption increased from 50 pounds to more than 70 pounds. Similar relationships could be observed in the later years. However, during the whole post-war period, notwithstanding the rising beef prices, per capita consumption increased significantly. A possible explanation is that no principal food product has a consumer preference as strong as that for beef and, in addition, the ratio of beef prices to per capita disposable income is declining. This means that with increasing buying power, the consumer is in a position to pay more for a preferred product.

The analysis of the relationship between the demand for beef and the retail price also indicates that, at present, the demand curve for beef shifted upward from the level at the beginning of the fifties. In the case of pork, it appears that the curve shifted downward. The simplest case seems to be that of poultry. Although there was a steady decrease in price throughout the period and a corresponding increase in consumption, this was a movement along the same demand curve, that is, the quantity-price curve, not a shift of the curve.

Factors Influencing Changes in Meat Consumption

Regression analysis was applied to estimate the relationship between per capita consumption of selected meat products, their prices, prices of competing products and income (2). The commodities selected were beef, pork, and poultry, and the period under analysis was the 20 years, 1949 to 1969. The coefficients of price, income and cross-elasticities for the commodities analyzed were obtained. In general, the computations for beef and poultry are significant and explain reasonably well consumption changes for the period studied. Results for pork were less satisfactory.

The analysis of the factors influencing changes in beef consumption (3) suggests that changes in consumption depend mostly on changes in beef price and on changes in personal income while prices of competing products, that is pork and poultry, play only a small role. If this is the case, then the future level of beef prices will be a very important factor determining the growth in the market for beef. Therefore, if future beef prices increase far beyond their present levels, then, on the basis of past experience, a slowing-down in the demand for beef could be expected. The computations indicate that a ten per cent increase in beef price results in a decline in consumption of about 7.5 per cent. However, if at the same time, there were an increase in income, then the positive income effect should counterbalance, to a degree, the negative effect of rising prices.

Although statistical research on the effects of income and prices on changes in pork consumption has been rather inconclusive, pork consumption appears to be strongly influenced by the price of beef. Poultry consumption, on the other hand, seems to depend mostly on the price of poultry and the level of income.

The use of demand relationships as illustrated above and in footnote (3) greatly oversimplifies cause and effect relationships since, in each equilibrium, price reflects a balancing of very complex forces influencing both demand and output. However these calculations serve to point out the main forces involved and their relative importance in influencing changes in demand for beef and other meat products.

PROSPECTIVE TRENDS

It seems that today it is more difficult to make projections about the future than at any time in the past.

The reason for this is, according to P. Drucker (4), that the age of continuity, which lasted until the middle of this century, is over and this is the age of

discontinuity in the world economy and in technology. From now on, there will be a period of greater change in technology and in economic policy, in industrial structures, in economic theory, in the knowledge needed to govern and to manage, and in economic issues.

In this change, agriculture has played and is going to play an important role. Although the agricultural labor force decreased from more than 40 per cent of the total labor force at the beginning of this century to less than ten per cent at present, Canadian farmers now produce much more food than the many more farmers did at the beginning of the century.

This is the result of the rapid expansion of agricultural technology which makes it increasingly possible for a small number of highly trained, highly equipped, commercial farmers to produce very large outputs. Farm technology is still growing, and a period of rapid increase in farm productivity may be just ahead, considering the fact that much of the available technology is not yet in general use. If all new technology proves to be economical and practical in application, then ten years from now, not only Canada, but almost every developed country, should be able to raise considerably more food than it can consume. In this case, shortages would disappear and the problem would consist mainly in implementing programs which would maintain the desired equilibrium between supply and demand.

Basic Assumptions and Methods

The projections in this paper of the future demand and requirements for meat are based on the analysis of relationships that existed in past and recent periods, and on certain general assumptions with regard to policies, prices, technological changes and changes in attitude.

It is assumed for the purpose of this projection exercise that present policies will remain basically unchanged and the prices will continue to develop in approximately the same way as in the recent past.

With regard to possible changes in food technology and in consumer attitudes, it is assumed that consumer attitudes change slowly (5), and that there is little likelihood of any large shift in meat consumption resulting from the use of new synthetic products between now and 1980 (6).

Ideally, the consumption projections for a commodity should take into account all factors that affect the demand for the commodity. However, at the present stage of knowledge, this is impossible. There is only limited information about some of the factors and their apparent influence on the demand.

TABLE 4—POPULATION AND INCOME, CANADA, 1952 TO 1969 AND PROJECTIONS TO 1980

Year	Gross National Product ^a		Disposable Income ^a		Expenditures on Goods and Services ^a		Population
	Total	Per Capita	Total	Per Capita	Total	Per Capita	
	million dollars	dollars	million dollars	dollars	million dollars	dollars	thousands
1952-54.....	28,181	1,896	18,712	1,259	17,449	1,174	14,864
1962-64.....	44,275	2,338	29,578	1,562	27,733	1,465	18,935
1967-69.....	58,100	2,802	39,285	1,894	36,005	1,736	20,737
1973.....	73,448	3,261	49,663	2,205	45,300	2,012	22,520
Percentage change from 1967-69 to 1973	26.4	16.4	26.4	16.4	25.8	15.9	8.6
1975.....	80,669	3,464	54,545	2,342	49,658	2,133	23,285
Percentage change from 1967-69 to 1975	38.8	23.6	38.8	23.7	37.9	22.9	12.3
1980.....	101,980	4,031	68,955	2,725	62,477	2,469	25,300
Percentage change from 1967-69 to 1980	75.5	43.9	75.5	43.9	73.5	42.2	22.0
Annual rate of change.....	4.8	3.0	4.8	3.1	4.7	3.0	1.7

^a 1961 constant dollars.

Sources: (1) Data for the period 1952-69 are taken from *National Accounts, Income and Expenditure*, Cat. No. 13-201, Dominion Bureau of Statistics.

(2) Projections for 1973, 1975 and 1980 are based on data from the Dominion Bureau of Statistics and the Economic Council of Canada.

For that reason, only income, which seems to play a dominant role, was initially considered and effects of income on changes in consumption of individual meat products were calculated. In this approach, income reflected the influence of all factors on consumption, without distinguishing between them. Although the calculated elasticity was linked to disposable income, it is not strictly income elasticity but a composite elasticity because it reflects all economic and commercial changes.

The consumption projections as presented in this paper were basically made by applying calculated coefficients of elasticity by means of appropriate functions (7) to a given assumption about future growth in per capita income. The projections were made from 1967-69, the base period, to 1973, 1975 and 1980.

In the second approach, income and prices were included, assumptions were made about their future trends, and by the application of multiple regression techniques, future demand was calculated. The second approach was applied only to the projection of the demand for beef in 1980.

For both approaches, projections were made first on per capita basis and then multiplied by the projected population in the corresponding years to get total demand.

In addition to the use of models, graphic extrapolation, international comparisons and the pragmatic approach were used to avoid what could be termed unrealistic results.

Population

According to the Census Division of the Dominion Bureau of Statistics, Canada's population will reach the level of 25.3 million in 1980 on the assumption of medium fertility and medium immigration (Table 4). These projections imply an average annual growth of about 1.7 per cent. The Bureau also presents other projections under different assumptions and these range from 24 million to 26.8 million. For this paper, the medium range was used because it is the closest to the present trend. According to these projections, the distribution of the population in 1980 by age groups will differ from the 1966 distribution only in the lower age groups. There will be relatively fewer persons in the age group up to 14 years and more in the age group from 15 to 34 years. The relative position of the age groups over 35 years will change only slightly. With regard to the distribution of population by areas, it is estimated that, by 1980, almost 85 per cent of the total population will live in urban areas.

Income

Projections of the gross national product were calculated on the basis of the average growth of total employment and the average growth of productivity as published in the *Fourth Annual Review* of the Economic Council of Canada, in 1967 (Table 4). Projections of disposable income were estimated on the basis of the average relationship between

TABLE 5—PER CAPITA CONSUMPTION OF MEAT, CANADA, 1952 TO 1969 AND PROJECTIONS TO 1980

Meat	1952-54	1962-64	1967-69	1973	1975	1980
	pounds					
Beef ^a I.....	63.2	74.9	85.7	97.5	102.0	114.0
II.....				95.0	98.0	106.0
Veal.....	7.9	6.9	6.2	5.0	5.0	5.0
Pork.....	50.0	50.9	53.1	53.5	53.5	54.0
Mutton and lamb..	2.4	3.7	3.9	4.0	4.0	4.0
Other.....	10.6	8.4	8.6	8.0	8.0	8.0
Red meat..	134.1	144.9	157.5	168.0	172.5	185.0
Poultry...	21.1	33.0	41.1	47.5	49.5	55.0
Total meat	155.2	177.9	198.6	215.5	222.0	240.0

^aI—projected on the basis of semi-log function, calculated income elasticity and specific assumptions about future growth of income.

II—extrapolation of the 1949-69 trend.

Sources: Data for 1952 to 1969 are taken from *Canadian Livestock and Animal Products Statistics*, Cat. No. 23-203 and *Production of Poultry and Eggs*, Cat. No. 23-202, Dominion Bureau of Statistics.

disposable income and the gross national product during the past 20 years.

According to these estimates, personal disposable income, expressed in 1961 constant dollars, will reach the level of \$69 billion in 1980, or about 75 per cent higher than in 1967-69. On a per capita basis, personal disposable income will increase from \$1,894 in 1967-69 to \$2,725 in 1980, or by almost 44 per cent. The average annual rate of growth of per capita disposable income will be about three per cent.

PROJECTIONS OF PER CAPITA AND TOTAL DEMAND FOR BEEF

Composite Elasticity Approach

On the basis of composite elasticity approach, per capita consumption of beef is projected to have the highest rate of increase of all red meat, from 85.7 pounds in 1967-69 to 114 pounds in 1980 (Table 5). Projected consumption in 1973 and 1975 will be 97.5 and 102 pounds respectively. Taking into account population growth, total beef consumption in 1980 might reach the level of 2.9 billion pounds, an increase of 62 per cent from the 1.8 billion pounds consumed in 1967-69 (Table 6).

Extrapolation of Post-War Trends

Beef projections were also made on the basis of extrapolation of the post-war trend in beef consumption. According to that approach, per capita consumption of beef is estimated to reach the level of 95 pounds in 1973, 98 pounds in 1975 and 106 pounds in 1980. Total consumption in 1980 is projected to be almost 2.7 billion pounds, about 51 per cent more than the 1967-69 average.

Multiple Regression Technique

Projections of beef consumption were also made by including income, price and cross-elasticities and applying multiple regression techniques. On the assumption that prices will continue to evolve in broadly the same way as in the past, beef consumption might reach the level of 117 pounds in 1980.

TABLE 6—TOTAL CONSUMPTION OF MEAT, CANADA, 1952 TO 1969 AND PROJECTIONS TO 1980

Meat	1952-54	1962-64	1967-69	1973	1975	1980
	million pounds					
Beef ^a I.....	939.4	1,418.2	1,777.1	2,195.7	2,375.1	2,884.2
II.....				2,139.4	2,281.9	2,681.8
Veal.....	117.4	130.7	128.6	112.6	116.4	126.5
Pork.....	743.2	963.8	1,101.1	1,204.8	1,245.7	1,366.2
Mutton and lamb.....	35.7	70.1	80.9	90.1	93.1	101.2
Other.....	157.6	159.1	178.3	180.2	186.3	202.4
Red meat.....	1,993.3	2,743.7	3,266.1	3,783.4	4,016.7	4,680.5
Poultry.....	313.6	624.9	852.3	1,069.7	1,152.6	1,391.5
Total meat.....	2,306.9	3,368.5	4,118.4	4,853.1	5,169.3	6,072.0

^aI—projected on the basis of semi-log function, calculated income elasticity and specific assumptions about future growth of income.

II—extrapolation of 1949-69 trend.

TABLE 7—PER CAPITA MEAT CONSUMPTION
IN CANADA AND THE UNITED STATES,
1949 TO 1969

Year	Beef		Red Meats		All Meats	
	Canada	U.S.	Canada	U.S.	Canada	U.S.
	pounds					
1950.....	50.8	63.4	127.4	154.7	143.5	179.4
1951.....	49.3	56.1	128.1	147.9	146.1	174.0
1952.....	54.4	62.2	132.2	156.2	153.9	183.0
1953.....	65.1	77.6	134.4	161.1	154.2	187.8
1954.....	70.2	80.1	135.8	165.3	157.5	193.4
1955.....	69.1	82.0	138.8	173.8	163.1	200.1
1956.....	71.4	85.4	141.8	177.9	167.4	207.5
1957.....	72.0	84.6	137.7	169.5	163.6	200.9
1958.....	68.0	80.5	137.4	161.4	164.9	195.4
1959.....	65.6	81.4	141.6	169.6	171.9	204.8
1960.....	70.0	85.2	143.6	171.5	171.3	205.8
1961.....	70.5	88.0	139.9	171.1	171.0	208.7
1962.....	71.1	89.1	140.6	173.6	171.6	210.6
1963.....	74.3	94.6	143.9	180.3	176.9	217.8
1964.....	79.4	99.8	150.2	185.0	185.2	223.4
1965.....	83.6	99.3	150.4	176.7	187.0	217.4
1966.....	84.1	104.0	149.2	180.6	188.5	224.4
1967.....	84.0	105.9	157.2	187.7	197.9	233.4
1968.....	86.7	109.4	159.4	192.9	199.1	237.9
1969.....	86.4	110.7	156.0	192.5	198.8	240.1

Sources: (1) Canadian data are taken from *Handbook of Agricultural Statistics, Part VI*, 1966, Cat. No. 21-504, and *Livestock and Animal Products Statistics*, Cat. No. 23-203, Dominion Bureau of Statistics.

(2) U.S. data are taken from *Food Consumption, Prices and Expenditure*, 1968, and *National Food Situation*, United States Department of Agriculture.

If beef prices increase by about five per cent above the long-term trend, per capita consumption will be 113 pounds, and if beef prices increase by about 15 per cent, the projected level of consumption in 1980 will be 106 pounds.

Projections of Per Capita Consumption of Other Meats

Per capita consumption of veal in 1973, 1975 and 1980 is expected to remain substantially unchanged

from 1969 level but lower than 1967-69 average. Total consumption of veal in 1980 will be at about the same level as in 1967-69.

Statistical research on the effects of income and prices on changes in pork consumption were rather inconclusive. Therefore, pork projections rely heavily on persistent long-run trends. In 1980, per capita consumption of pork is estimated to be only slightly higher than at present and total consumption, to be about 24 per cent higher.

However, total consumption of all red meat is projected to be about 43 per cent higher in 1980 than in 1967-69. Poultry is projected to increase at about the same rate as beef and, at the end of the present decade, to be at the same level as pork.

Meat Consumption in Canada and the United States

During the whole post-war period, the level of per capita meat consumption in Canada was substantially lower than in the United States. However, the difference between the levels of meat consumption in the two countries has not been constant, but has been getting larger, especially during the last five years (Table 7). The projected level of consumption for Canada for the 1980's is the level of consumption already reached in the United States.

CATTLE AND CALVES ON FARMS AND OUTPUT

Past Trends

From 1949 to 1965, the number of cattle on farms increased at an average annual rate of 2.9 per cent. In 1965, the number of cattle reached a peak of 13.3 million head, and then declined. In June 1969, the number of cattle on farms was only slightly higher than in 1963. Most of the decrease was in the number of cows and calves. However, the survey in December 1969 (8) indicated a sharp increase in the number of

TABLE 8—ANIMALS SLAUGHTERED FOR CONSUMPTION AND CATTLE ON FARMS, CANADA, 1952 TO 1969 AND REQUIREMENTS FOR 1973, 1975 AND 1980

	1952-54	1962-64	1967-69	1973	1975	1980
	thousand					
Cattle slaughtered* (excluding calves) I.....	1,982.1	2,739.1	3,310.1	3,994	4,278	5,075
II.....				3,894	4,114	4,726
Cattle on farms at June 1* (excluding calves and milk cows) I....	4,144.8	6,098.7	6,532.8	7,988	8,555	10,150
II.....				7,788	8,227	9,452
Calves slaughtered.....	1,129.5	1,097.7	1,062.5	886	909	966
Calves on farms at June 1.....	2,495.0	3,491.2	3,449.1	3,367	3,545	3,864

* I—based on consumption projection I in Table 6.

II—based on consumption projection II in Table 6.

Source: *Canadian Livestock and Animal Products Statistics*, Cat. No. 23-203, Dominion Bureau of Statistics.

calves and a slight increase in the number of cattle other than milk cows.

The number of cattle (other than calves) slaughtered followed generally the trend of cattle on farms. During the 1949-69 period, the proportion of cattle on farms (other than calves and milk cows) to cattle slaughtered remained relatively constant at a ratio of two to one.

The average cold dressed weight of animals slaughtered has shown an upward trend. In 1949, the average carcass weight was about 468 pounds and in 1969, it was close to 555 pounds.

Until June 1965, the number of calves on farms was increasing at a slightly higher rate than total cattle. Between 1965 and 1969, the number of calves declined from 3.7 million to 3.4 million head. In December 1969, the number of calves increased significantly and was again at the same level as in 1965. Because the number of calves slaughtered has been generally decreasing, the ratio of calves on farms to the number slaughtered has been increasing. From 1951 to 1957, the ratio was two to one and from 1959 to 1968, it increased to three to one and in 1969, it showed a further upward trend.

Exports of cattle and calves have shown quite significant annual fluctuations with no definite trend.

Future Cattle Requirements

Total demand for beef in 1980 is projected to be 2.7 to 2.9 billion pounds. To meet these requirements, the number of cattle slaughtered would have to be between 4.7 and 5.1 million head (Table 8). The number of cattle slaughtered was calculated on the basis of an average cold dressed carcass weight of 580 pounds. If the average carcass weight is lower, then the required number would have to be higher.

To meet these requirements by 1980, the number of cattle slaughtered would have to increase between 3.5 and 4.1 per cent annually. The lower rate of increase is roughly the same as for the whole post-war period, while the higher rate is almost the same as that prevailing between 1959 and 1969.

To meet the requirements by 1973, that is, for the next four years, the average annual increase in cattle slaughtered would have to be substantially higher than the present rate of growth. The requirements of higher demand would call for an annual increase in cattle slaughtered of about 5.2 per cent, while lower demand would require an annual increase in slaughter of about 4.3 per cent.

In line with the projected increase of cattle for slaughter, there must be a corresponding increase of cattle on farms to provide a larger breeding herd which is the essential prerequisite for an expanding beef industry.

Applying the 1949-69 average ratio of cattle on farms to cattle slaughtered, it is estimated that by 1980, the number of cattle on farms (excluding calves and milk cows) would have to be between 9.5 and 10.2 million head.

Although requirements for slaughter cattle in 1980 will be considerably higher, the requirements for slaughter calves will remain essentially unchanged from the present level. However, there must be a further build-up of calf inventory on farms to promote the growth of the whole livestock industry.

SUMMARY AND CONCLUSIONS

The analyses and projections were made for all types of meat with special emphasis on beef. Analyses cover the period from 1949 to 1969 and projections cover the period from 1968 to 1980.

The findings show that, at present, beef consumption in Canada is the highest of all meats and that consumer preferences seem to be strongly oriented toward beef consumption in comparison with pork.

During the past two decades, the increase in beef consumption was very significant and the apparent reason seems to be higher consumer buying power and the relatively competitive price of beef to other types of meat. However, notwithstanding the strong preference for beef, it was evident that the consumer generally reacted adversely to sharp increases in beef prices and it would appear that in the future, the rising price of beef will be an important factor restraining consumption.

Projections of the demand for meat suggest that the outlook for beef and also for other meat products in Canada is favorable and the demand is likely to show a substantial increase.

Projections of per capita demand for beef show an increase of 20 to 28 pounds between 1967-69 and 1980. Total demand is projected to increase from 1.8 billion pounds in 1967-69 to about 2.9 billion pounds in 1980 or about 62 per cent.

Of other meats, only poultry is projected to have a similar rate of growth, although the growth of consumption of all other meats will also be substantial.

To meet the projected demand for beef, the number of slaughter cattle will have to increase by 1.4 to 1.8 million head above the 1967-69 level. If exports remain at about recent levels, then total output of cattle by 1980 would have to reach the level of at least 5.3 million head to fulfill these requirements.

If the supply of beef is not forthcoming, beef prices will rise and put downward pressure on consumption. Also, beef import requirements would rise, and there would be a shift from beef to pork and poultry consumption and added incentive for

development and use of meat substitutes, especially as meat extenders.

The projected requirements for cattle and calves are not a detailed and specific plan for the industry. They indicate only a general trend of probable future developments based on the analysis of past and present relationships.

To meet the growing demand for beef not only in Canada but in all developed countries is a challenge to the whole livestock industry.

A strong and growing beef industry in Canada will not only provide a livelihood to those involved in its operations but will also have a multiplier effect on the whole economy.

NOTES AND REFERENCES

(1) *Urban Family Food Expenditures*, 1953, 1955, 1957 and 1962, occasional publications, Cat. Nos. 62-511, 62-512, 62-516 and 62-524, Dominion Bureau of Statistics.

(2) In this approach, double-log and semi-log functions were used. Data were in current and constant dollars. Most of the analyses involved multiple regression analysis, although in some cases, simple regressions were also used.

(3) The following equations illustrate the factors influencing changes in consumption.

$$\log q_1 = 1.29 - .74 \log p_1 + .16 \log p_2 - .08 \log p_3 + .88 \log i$$

(.04) (.07) (.05) (.07)

$$R^2 = .99$$

$$\log q_2 = 1.17 + .63 \log p_1 - .47 \log p_2 + .09 \log p_3 + .005 \log i$$

(.10) (.15) (.11) (.17)

$$R^2 = .75$$

$$\log p_3 = .87 - .12 \log p_1 - .21 \log p_2 - .56 \log p_3 + 1.07 \log i$$

(.12) (.18) (.14) (.21)

$$R^2 = .98$$

q_1 = per capita consumption of beef
 q_2 = per capita consumption of pork
 q_3 = per capita consumption of poultry
 p_1 = retail price of beef
 p_2 = retail price of pork
 p_3 = retail price of poultry
 i = personal disposable income per capita
 (prices and income deflated by the consumer price index)

(4) Drucker, Peter F., *The Age of Discontinuity, Guidelines to Our Changing Society*, Harper and Row Publishers, New York and Evanston, 1968.

(5) The slowness of the decrease in cigarette smoking in response to adverse scientific findings provides an example of the low rate of response of consumer attitudes to changes in information.

(6) The development of synthetic meat products of vegetable origin is still in its early stage. The cost of production is high and the demand is limited. However, in the United States, a number of food companies are producing and selling such synthetics. These products look and taste like bacon, ham, fried chicken, meat loaf, sausages and other meats. It is expected that these synthetic products will be used as meat extenders, and as a means of improving natural meat products, primarily canned meat and sausages.

A. D. Odell of General Mills Inc., Minneapolis, states that sales of meat analogues in the United States are about \$10 million and will increase to \$2 billion, about five per cent of total meat sales, in ten years.

At present, Canadian industry is not involved in the development of synthetic meat products.

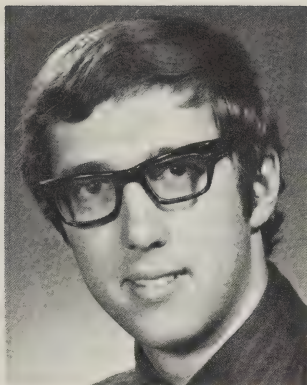
(7) Increase in per capita demand was projected by applying the following functions:

$$\text{semi-log: } \frac{y^1}{y} - 1 = 2.3026e \log \frac{x^1}{x}$$

$$\text{log-inverse: } \log \frac{y^1}{y} = 0.4343e \left(1 - \frac{x}{x^1} \right)$$

y , y^1 and e refer respectively to per capita income, per capita consumption and elasticity coefficient at the beginning of the period (1967-1969); x^1 and y^1 refer to income and consumption at the end of the projection period, (1973, 1975 and 1980).

(8) *Report on Livestock Surveys: Cattle, Horses and Sheep*, Cat. No. 23-004, Dominion Bureau of Statistics.



AN ANALYSIS OF THE PRODUCTION AND MARKETING OF SOLIDS-NON-FAT AND BUTTERFAT

R. MacKay¹

"... have milk products been sold or gone into inventory?" "... what proportion of solids-non-fat and butterfat is sold domestically and abroad?" "... what are the trends in domestic and export sales?" This paper answers these and other questions about the Canadian dairy industry.

Increasing awareness in the Canadian dairy industry of the size of its market requires an analysis of the market components and the "mix" of products offered. The total demand for dairy products is derived from two sources—the domestic market (1) and the international market. The product mix can be analyzed in terms of the two main components of dairy products—butterfat and solids-non-fat (SNF). This paper describes the domestic and international markets for both butterfat and solids-non-fat, and shows changes in relative amounts of butterfat and solids-non-fat produced and consumed.

FLUID MILK PRODUCTS

The fluid trade is confined within provincial boundaries and the data used in this analysis are the "fluid sales" (2).

The sales of fluid products with low butterfat content, such as partly skimmed milk, have increased their market penetration, partly at the expense of standard and special milks which have a higher butterfat content. This shift from standard and special milks to partly skimmed (two per cent) milk has changed the relative amounts of butterfat and

TABLE 1—SALES OF FLUID MILK, CANADA, 1964 TO 1969

	1964	1965	1966	1967	1968	Percentage Distribution	
						1969	1969
SOLIDS-NON-FAT							
				million pounds			per cent
Standard milk.....	291.4	291.1	284.8	276.6	270.9	261.2	62.7
Special milk.....	1.7	1.4	1.1	.9	.8	.7	.2
Partly skimmed (2 per cent) milk.....	50.8	60.7	73.3	86.4	99.6	114.8	27.6
Skim milk, buttermilk and chocolate milk.....	28.6	29.2	28.5	26.7	26.7	27.2	6.5
Cereal cream.....	8.0	8.3	8.5	8.7	9.1	9.3	2.2
Table cream.....	1.5	1.4	1.2	1.1	1.0	.9	.2
Whipping cream.....	1.4	1.4	1.3	1.3	1.4	1.3	.4
Sour cream.....	.5	.5	.6	.6	.7	.7	.2
Total reported sales.....	383.9	394.0	399.3	402.4	410.2	416.1	100.0
BUTTERFAT							
Standard milk.....	113.3	113.2	110.8	107.6	105.3	101.6	65.2
Special milk.....	.9	.7	.5	.4	.4	.4	.3
Partly skimmed (2 per cent) milk.....	11.3	13.5	16.3	19.2	22.1	25.5	16.4
Skim milk, buttermilk and chocolate milk.....	2.4	2.4	2.4	2.3	2.3	2.5	1.6
Cereal cream.....	11.7	12.2	12.5	12.8	13.3	13.6	8.8
Table cream.....	4.0	3.6	3.1	2.9	2.6	2.3	1.5
Whipping cream.....	8.1	8.2	7.7	7.7	7.9	7.7	5.0
Sour cream.....	1.3	1.4	1.4	1.6	1.7	1.8	1.2
Total reported sales.....	153.0	155.2	154.7	154.5	155.6	155.4	100.0

Source: *Fluid Milk Sales*, Cat. No. 23-002, Dominion Bureau of Statistics.

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solids-non-fat in fluid sales, in favor of solids-non-fat. Although the number of quarts of milk sold increased by five per cent from 1,547 million quarts in 1966 to 1,633 million in 1969, the amount of butterfat marketed in the same period increased by less than one-half of one per cent (Table 1).

On the other hand, the consumption of solids-non-fat, representing the upward trend in physical volume of milk sold, increased by about five per cent in the same period, from 399.3 million pounds to 416.1 million pounds.

The change in the ratio of the amount of butterfat sold to the amount of solids-non-fat sold illustrates this. In 1964, the ratio was 40 pounds of butterfat for every 100 pounds of solids-non-fat. In 1969, this ratio was 37 to 100. This widening of the ratio was mainly a result of the lower butterfat to solids-non-fat ratio (22 to 100) in partly skimmed milk. As sales of partly skimmed milk increased at the rate of 15 per cent a year, the ratio of butterfat to solids-non-fat in total sales moved toward this lower figure of 22 to 100. In 1969, sales of partly skimmed milk accounted for approximately one-third (28 per cent) of the volume of sales of solids-non-fat, but only one-sixth (16 per cent) of the sales of butterfat. In contrast, sales of whole milk accounted for 66 per

cent of the butterfat sold and 63 per cent of the solids-non-fat.

Sales of cream products in the fluid industry have not increased significantly from 1966 to 1969, similar to the trend set by total butterfat sales. Cream products accounted for 16 per cent or 25 million pounds of the butterfat marketed in fluid products in 1969, but for less than three percent of the solids-non-fat. On a national basis, the amount of butterfat sold in cream remained almost constant from 1964 to 1969.

MANUFACTURED DAIRY PRODUCTS

The analysis of manufactured dairy products is focused on those products that command a significant share of the market or show substantial growth, such as butter, cheddar cheese, evaporated whole milk, skim milk powder, whey powder and ice cream mix.

Production

From 1966 to 1969, solids-non-fat production increased 24 per cent from 500 million to 622 million pounds (Table 2). In 1966, 51 per cent of the SNF produced was used to manufacture 254 pounds of

TABLE 2—PRODUCTION AND CONSUMPTION OF SOLIDS-NON-FAT IN MANUFACTURED DAIRY PRODUCTS, CANADA, 1964 TO 1969

	1964	1965	1966	1967	1968	1969	Percentage Distribution 1969
	million pounds					per cent	
PRODUCTION							
Butter.....	3.6	3.5	3.4	3.4	3.4	3.6	.6
Cheddar cheese.....	44.8	49.0	52.1	50.0	51.4	52.0	8.4
Other cheese ^a	10.6	12.0	14.0	15.4	16.5	19.0	3.1
Concentrated whole milk products ^b	83.1	81.5	71.4	67.2	65.8	63.1	10.2
Skim milk powder.....	195.9	214.4	254.3	305.0	346.0	381.0	61.2
Casein.....	18.1	20.8	22.0	14.3	11.9	10.1	1.6
Whey powder.....	31.6	40.1	40.7	38.4	41.0	41.8	6.7
Ice cream mix.....	16.4	17.9	21.3	24.6	24.8	26.6	4.3
Other skimmed milk products ^c	19.1	20.7	20.9	23.4	23.8	24.3	3.9
Total.....	423.2	459.9	500.1	541.7	584.6	621.5	100.0
CONSUMPTION							
Butter.....	3.7	3.6	3.6	3.5	3.4	3.3	.8
Cheddar cheese.....	35.2	37.0	36.4	39.6	39.8	44.0	10.0
Other cheese ^a	15.4	17.0	18.6	21.5	23.6	27.7	6.3
Concentrated whole milk products ^b	67.3	66.9	65.1	65.0	61.2	61.0	13.9
Skim milk powder.....	148.0	134.0	157.9	134.7	153.0	204.0	46.6
Casein.....	7.6	5.3	6.2	8.3	4.0	5.8	1.3
Whey powder.....	29.7	38.9	41.6	33.8	36.4	41.8	9.5
Ice cream mix.....	16.4	17.9	21.3	24.6	24.8	26.6	6.1
Other skimmed milk products ^c	19.6	20.6	20.6	23.0	23.9	24.3	5.5
Total.....	342.9	341.2	371.3	354.0	370.1	438.5	100.0

^a Includes cottage cheese.

^b Includes evaporated whole milk, partly skimmed milk, condensed milk, whole milk powder and other whole milk products.

^c Includes evaporated and concentrated skim milk, powdered buttermilk and other milk by-products.

Sources: *Dairy Review*, Cat. No. 23-001 and *Dairy Statistics*, Cat. No. 23-201, Dominion Bureau of Statistics.

TABLE 3—PRODUCTION AND CONSUMPTION OF BUTTERFAT IN MANUFACTURED DAIRY PRODUCTS, CANADA, 1964 TO 1969

	1964	1965	1966	1967	1968	1969	Percentage Distribution 1969
	million pounds					per cent	
PRODUCTION							
Butter.....	293.5	280.1	277.0	274.1	279.0	288.0	69.8
Cheddar cheese.....	49.2	53.8	57.2	54.7	56.3	57.0	13.8
Other cheese ^a	6.2	7.4	9.1	10.2	11.0	13.0	3.2
Concentrated whole milk products ^b	33.5	33.1	29.5	27.8	27.5	25.5	6.2
Powdered buttermilk and whey ^c.....	.7	.6	.5	.7	.8	.9	.2
Ice cream mix.....	17.1	18.8	22.3	25.8	26.0	29.9	6.8
Total.....	400.2	393.8	395.6	393.3	400.6	412.3	100.0
Residual.....	2.8	5.2	6.4	5.7	6.4	8.7	
DBS total ^d	403.0	399.0	402.0	399.0	407.0	421.0	
DOMESTIC CONSUMPTION							
Butter.....	297.1	295.3	288.4	279.9	276.0	266.0	68.4
Cheddar cheese.....	38.6	40.6	39.9	43.4	44.0	48.2	12.4
Other cheese ^a	10.6	12.1	13.4	15.9	17.7	21.0	5.4
Concentrated whole milk products ^b	27.5	27.5	27.0	26.9	25.8	24.9	6.4
Powdered buttermilk and whey ^c.....	.7	.6	.6	.7	.8	.9	.2
Ice cream mix.....	17.1	18.8	22.3	25.8	26.0	27.9	7.2
Total products.....	391.6	394.9	391.6	392.6	390.3	388.9	100.0

^a Includes cottage cheese.

^b Includes evaporated whole milk, condensed milk, partly skimmed milk, whole milk powder and other whole milk products.

^c Includes other milk by-products.

^d Estimated totals derived from Dominion Bureau of Statistics data on milk equivalent, converted to a butterfat equivalent on the basis of 3.5 per cent butterfat. The residual is due to the conversions from product to butterfat and SNF and into milk equivalents.

Sources: *Dairy Review*, Cat. No. 23-001 and *Dairy Statistics*, Cat. No. 23-201, Dominion Bureau of Statistics.

skim milk powder. In 1969, 381 million pounds of powder were produced using 61 per cent of the SNF production. This 50 per cent increase in skim milk powder production was much greater than the increase in total milk production during the same period.

Two factors accounting for the great increase in powder production were: (1) a substantial shift in milk use from casein to dry skim milk, which accounted for 42 million pounds of additional powder production; and (2) the shift from marketing cream to marketing whole milk, which accounted for an increase in powder production of about 62 million pounds (3).

The main use of butterfat was in the manufacture of butter which used 70 per cent of the butterfat produced (Table 3). Butter production (in terms of butterfat used) increased at the same annual rate (about four per cent) from 1966 to 1969 as that of total butterfat production.

Consumption

Domestic consumption of SNF increased by 67.2 million pounds between 1966 and 1969, bringing the total utilization up by 18 per cent, from 371.3 million pounds to 438.5 million pounds (Table 2). Dry skim

milk accounted for 46 million pounds of this increase. Dry skim milk has not only a relatively large market share but also showed a marked growth in domestic use. In 1969, 47 per cent of the total SNF consumed was in the form of dry skim milk.

In contrast with the trend in SNF consumption, butterfat consumption decreased slightly more than two million pounds during the 1966-69 period (Table 3). The main outlet for butterfat is in the production of butter. In 1969, 69 per cent of the total butterfat consumed in manufactured products was in the form of butter. Although the amount of butterfat consumed as butter decreased by 7.8 per cent (22.4 million pounds) from 1966 to 1969, part of the decrease was offset by increases in butterfat used in cheddar cheese (an increase of 21 per cent), in ice cream (25 per cent) and in other cheeses, powdered buttermilk, whey and other milk by-products (56 per cent).

The main reason for increased SNF but static butterfat use is that the latter has close substitutes whereas the former does not.

Imports

Imports contributed only a small portion of the total SNF and butterfat supply in Canada, about

3.4 per cent in 1969. The reason for this minor role of imports is the restriction placed on imports under the authority of the Export and Import Permits Act and the Canadian Dairy Commission (CDC) Act. Under these acts, all dairy products which are directly associated with the CDC product price support program are subject to import control. The one notable exception is the class of specialty cheeses. These imports have a significant impact on the Canadian market for specialty cheeses, since they

account for approximately two-thirds of the milk solids brought into the country—about one-half of the SNF and more than three-quarters of the butterfat (Tables 4 and 5).

Exports

In 1966, 106 million pounds of SNF were exported, 22 per cent of total SNF disposition in that year. In 1969, exports increased to 255.3 million pounds, accounting for 37 per cent of SNF disposition.

TABLE 4—CANADIAN IMPORTS AND EXPORTS OF SOLIDS-NON-FAT, 1964 TO 1969

	1964	1965	1966	1967	1968	1969
	million pounds					
IMPORTS						
Cheese	4.90	5.65	5.82	7.60	8.65	10.00
Powdered cream	.03	.02	.01	—	—	—
Powdered milk, cream and by-products, n.e.s.	1.32	5.29	1.88	5.02	5.67	5.32
Condensed and evaporated milk, cream and by-products, n.e.s.	1.48	1.03	3.00	2.44	2.15	1.45
Casein	.57	.30	.46	.43	1.44	1.14
Dairy products, n.e.s.	—	—	—	—	—	1.34
Total Imports	8.30	12.29	11.17	15.49	17.91	19.25
EXPORTS						
Cheddar cheese	9.40	9.82	10.80	8.06	13.22	9.03
Cheese, n.e.s.	.43	.13	.24	.53	.48	2.18
Whole milk powder	12.90	13.75	4.70	3.41	.54	.45
Skim milk powder	40.70	83.30	67.00	91.50	122.20	230.00
Evaporated milk	3.28	1.20	1.54	1.32	1.30	1.22
Powdered milk, cream and by-products, n.e.s.	5.24	10.96	4.46	2.08	2.73	4.37
Condensed and evaporated milk, cream and by-products, n.e.s.	.10	.03	.14	—	—	—
Casein	10.98	14.23	15.53	7.44	3.68	5.95
Dairy products, n.e.s.	2.30	2.13	1.63	2.36	2.70	2.10
Total Exports	85.33	135.55	106.04	116.70	146.85	255.30

— = none reported.

n.e.s. = not elsewhere specified.

Source: *Trade of Canada* Cat. No. 65-201, Dominion Bureau of Statistics.

TABLE 5—CANADIAN IMPORTS AND EXPORTS OF BUTTERFAT, 1964 TO 1969

	1964	1965	1966	1967	1968	1969
	million pounds					
IMPORTS						
Cheese.....	4.59	5.30	5.46	7.12	8.10	9.50
Powdered cream.....	.10	.06	.03	.01	—	—
Powdered milk, cream and by-products, n.e.s.....	.47	1.89	.67	1.79	2.02	2.12
Condensed and evaporated milk, cream and by-products, n.e.s.	—	—	—	—	—	—
Dairy products, n.e.s.....	—	—	—	—	—	.16
Total.....	5.16	7.25	6.16	8.92	10.12	11.78
EXPORTS						
Butter.....	31.80	.11	.13	.04	—	—
Cheddar.....	10.30	10.78	11.97	8.85	14.50	9.90
Cheese, n.e.s.....	.40	.12	.22	.50	.45	2.05
Whole milk powder.....	4.98	5.30	1.81	1.31	.21	.17
Evaporated milk.....	1.41	.52	.66	.57	.56	.53
Powdered milk, cream and by-products, n.e.s.....	1.87	3.92	1.59	.74	0.97	1.56
Condensed and evaporated milk, cream and by-products, n.e.s.	—	—	—	—	—	—
Dairy products, n.e.s.....	.26	.24	.18	.26	.30	.23
Total.....	51.02	20.99	16.56	12.27	16.99	14.44

— = none reported.

n.e.s. = not elsewhere specified.

Source: *Trade of Canada*, Cat. No. 65-201, Dominion Bureau of Statistics.

Dry skim milk and cheddar cheese are the principal dairy exports from Canada. Ninety per cent (230 million pounds) of 1969 SNF exports were in the form of dry skim milk. Exports of dry skim milk were unusually high in 1969 because of the disposition of stocks from earlier years. Cheddar cheese exports accounted for nine million pounds of the SNF exports, about 3.5 per cent of the total in 1969.

More than two-thirds of the 14.4 million pounds of butterfat exported in 1969 was in the form of cheddar cheese. As a market outlet for butterfat, cheese exports take between three and four per cent of total demand.

BALANCE SHEET FOR MANUFACTURED DAIRY PRODUCTS (4)

The balance sheet brings together the demand and supply data of the dairy industry and reveals the relationship between them (Tables 6 and 7). By comparing the total supply (opening stocks, production, imports) with total disposition (domestic consumption and exports), the balance sheet answers questions regarding the performance of the industry, such as: "has production been sold or gone into inventory?" "what proportion of production is sold domestically and abroad?" "is the industry on a net

TABLE 6—SUPPLY AND DISPOSITION OF SOLIDS-NON-FAT IN MANUFACTURED DAIRY PRODUCTS AND FLUID MILK, CANADA, 1964 TO 1969

	1964	1965	1966	1967	1968	1969
	million pounds					
Opening stocks.....	51.8	58.5	60.7	94.3	172.0	246.5
Production						
Manufactured.....	423.2	459.9	500.1	541.7	584.6	621.5
Fluid.....	383.9	394.0	399.3	402.4	410.2	416.1
Imports.....	8.3	12.3	11.2	15.5	17.9	19.3
Total supply						
Manufactured only.....	483.3	530.7	572.0	651.5	774.5	887.3
Including fluid.....	867.2	924.7	971.3	1,053.9	1,184.7	1,303.4
Domestic consumption						
Manufactured.....	342.9	341.2	371.3	354.0	371.1	438.5
Fluid.....	383.9	394.0	399.3	402.4	410.2	416.1
Exports.....	85.7	135.6	106.0	117.7	146.9	255.3
Total disposition						
Manufactured only.....	428.6	476.8	477.3	471.7	518.0	693.8
Including fluid.....	812.5	870.8	876.6	874.1	928.2	1,109.9
Final stocks ^a	54.7	53.9	94.7	179.8	256.5	193.5
Residual.....	+3.8	+6.8	-4	-7.8	-10.0	-8
Actual year-end stocks ^b	58.5	60.7	94.3	172.0	246.5	192.7

^a Final stock figures are obtained by deducting total disposition figures from total supply figures.

^b Actual year-end stocks are those published by the Dominion Bureau of Statistics for principal dairy products. These are used for opening stocks to keep the residual, which is principally due to conversion, to a minimum.

TABLE 7—SUPPLY AND DISPOSITION OF BUTTERFAT IN MANUFACTURED DAIRY PRODUCTS AND FLUID MILK, CANADA, 1964 TO 1969

	1964	1965	1966	1967	1968	1969
	million pounds					
Opening stocks.....	135.3	100.0	89.7	82.5	80.7	85.2
Production						
Manufactured.....	403.0	399.0	402.0	399.0	407.0	421.0
Fluid.....	153.0	155.2	154.7	154.5	155.6	155.4
Imports.....	5.2	7.3	6.2	8.9	10.1	11.8
Total supply						
Manufactured only.....	543.5	506.3	497.9	490.4	497.8	518.0
Including fluid.....	696.5	661.5	652.6	644.9	653.4	673.4
Domestic consumption						
Manufactured.....	391.6	394.9	391.6	392.6	390.3	388.9
Fluid.....	153.0	155.2	154.7	154.5	155.6	155.4
Exports.....	51.0	21.0	16.6	12.3	17.0	14.4
Total disposition						
Manufactured only.....	442.6	415.9	408.2	404.9	407.3	403.3
Including fluid.....	595.6	571.1	562.9	559.4	562.9	558.7
Final stocks ^a	100.9	90.4	89.7	85.5	90.5	114.7
Residual.....	-9	-7	-7.2	-4.8	-5.3	-8.3
Actual year-end stocks ^b	100.0	89.7	82.5	80.7	85.2	106.4

^a Final stock figures are obtained by deducting total disposition figures from total supply figures in the balance sheet.

^b Actual year-end stocks are those published by the Dominion Bureau of Statistics for principal dairy products. These are used for opening stocks to keep the residual, which is principally due to conversion, to a minimum.

export or import basis?" "what are the trends in domestic and export sales?"

Solids-non-fat

Total disposition of SNF in manufactured products in 1969 was 693.8 million pounds, up 62 per cent from 1964. From 1964 to 1969, exports of SNF, which were 13 times as large as imports in 1969, increased dramatically—by almost 200 per cent to 255.3 million pounds, while domestic consumption rose by 28 per cent to 438.5 million pounds. The upward trend in exports increased exports' share in total disposition of manufactured products to 37 per cent in 1969 from 20 per cent in 1964 (Table 6).

Total production of SNF increased rapidly during the 1960's reaching 621.5 million pounds in 1969, an increase of about 200 million pounds from 1964. Total supply increased by almost 400 million pounds during the same period to 887 million pounds in 1969. Of this increase, 100 million pounds were added to domestic consumption, 170 million pounds to exports, and the balance of 130 million pounds to inventories.

By early 1970, however, these inventories were greatly reduced by large export sales of dry skim milk. The present trends in production and sales of SNF have led to a decrease in stocks from the peak level in 1968.

Butterfat

The domestic consumption of butterfat in Canada showed no significant change since 1964 (Table 7). Because the domestic consumption accounts for such a large proportion of the total butterfat disposition (96 per cent in 1969), the trends closely parallel each other. Since 1966, the disposition of butterfat remained quite constant at slightly less than 400 millions pounds.

In 1964 and 1965, exports of butterfat were higher than usual, increasing the total disposition, but in 1966, exports returned to their normal level. Although Canada is a net exporter of butterfat, the difference between exports and imports accounted for less than one per cent of the total disposition in 1969.

Production of butterfat in manufactured products was steady at about 400 million pounds from 1964 to 1968 but increased to 421 million pounds in 1969. Almost two-thirds of the production increase went into inventories, which were 106.4 million pounds at the end of 1969. The small decreases in exports and domestic consumption and the slight increase in imports also contributed to the 21 million pound increase (2.5 per cent) in inventories from 1968 to 1969.

SUMMARY AND CONCLUSIONS

Concern is mounting over the imbalance created by over-production and under-consumption of both solids-non-fat and butterfat in the Canadian dairy industry. The shift from standard and special milks to partly skimmed milk reduced the amount of butterfat consumed through fluid sales. Recent increases in milk production resulted in steady increases in both solids-non-fat and butterfat production in the manufacturing sector. Although the consumption of SNF in manufactured products increased during the past six years, the amount of butterfat used remained almost constant. The main reason for the increased SNF use but steady butterfat consumption is that butterfat has close substitutes whereas SNF do not.

Specialty cheeses account for most of the imports of both SNF and butterfat, but dry skim milk is responsible for the major portion of SNF exports. Final stocks of butterfat increased from 1964 to 1969 and can be expected to increase in the future because of decreasing butter consumption. Stocks of SNF depend to a large extent on the export trade. If foreign trade in SNF continues at its present rate, stocks of that milk solid component should not increase, although they will probably remain at a fairly high level.

Unless changes are implemented to improve the present situation, the current trends of over-production and under-consumption can be expected to produce surplus stocks of both SNF and butterfat. The idea of national market sharing quotas is one plan which could help to alleviate this problem. It should be given serious thought.

NOTES AND REFERENCES

- (1) An analysis of the domestic market for butterfat and solids-non-fat is contained in the article "Trends in Production and Utilization of Milk Solids-Non-Fat and Butterfat", by H. J. Mestern and V. McCormick, *Canadian Farm Economics*, Vol. 3, No. 4, October 1968, Economics Branch, Canada Department of Agriculture, pp. 1 to 5.
- (2) "Fluid sales", as reported by the Dominion Bureau of Statistics, are the only data available on fluid milk production on a national basis.
- (3) Canadian Dairy Commission records indicate that 25 million to 27 million pounds of butterfat were shipped in the form of whole milk instead of cream in 1969. This meant that about 62 million pounds of additional powder were produced.
- (4) To include "fluid sales" in the balance sheet, the totals for butterfat and solids-non-fat would be added to the supply side and the demand side. There are no exports and imports or stocks.
- (5) Gratitude is due to Dr. H. J. Mestern, Economic Advisor for the Canadian Dairy Commission, for his assistance and instructions in the preparation of this paper.



J. S. Carmichael

RYE PRODUCTION IN CANADA

... the prospects for
rye are rather poor ...
world demand is
declining... nevertheless,
fall rye does well on
some poor soils, both
for grazing and for grain.



M. A. Norman

Rye, until a few years ago a major feed grain especially in Europe and Asia, is now of decreasing significance for food throughout former large consuming areas such as Western Europe. In Europe and Asia, most rye is planted in the fall: it can be grown in certain colder and drier regions where winter wheat cannot ordinarily survive the winter. Rye is used mainly as a bread grain in the Soviet Union, Poland and other parts of Eastern Europe; elsewhere it is used predominantly as a feed grain. As an animal feed, rye is almost equal to wheat but less palatable.

In Canada, about 85 per cent of the rye grown is fall rye. Although rye yields are not as high as average spring wheat yields, rye can often produce a good crop on light, sandy soil where spring wheat might not get adequate moisture. Fall rye in Canada is valuable in preventing soil drifting, in helping control wheat stem sawfly, in controlling weeds and in providing early grazing. Pelleting rye in pig rations has been found to improve feed utilization. Rye must be kept free from ergot which could make it completely unsatisfactory as feed; even No. 4 Canada West rye is not allowed more than one-third of one per cent of ergot after removal of dockage.

WORLD PRODUCTION AND TRADE

In 1969, world rye production, according to the United States Department of Agriculture, was 1,204 million bushels (Table 1), a decrease of 55 million bushels or four per cent from 1968 and a five per cent reduction from the 1960-64 average production. World acreage decreased about 23 per cent between the 1960-64 period and 1969, but yields are improving. Of the total 1969 production, the U.S.S.R. with 467 million bushels had about 39 per cent; Eastern

TABLE 1—WORLD RYE PRODUCTION AND ACREAGE, BY YEAR OF HARVEST, AVERAGE 1960-64 AND ANNUAL 1968 AND 1969

Country	Acreage			Production		
	Average 1960-64	1968	1969 ^a	Average 1960-64	1968	1969 ^a
	million acres			million bushels		
Canada.....	.6	.7	.9	11	13	16
United States..	1.7	1.0	1.3	32	23	31
North America	2.3	1.7	2.2	43	36	48
Argentina.....	1.6	1.5	n.a.	19	14	14
South America.	1.6	1.6	1.6	20	15	15
European Economic Community						
West Germany	2.9	2.4	2.2	127	126	114
France.....	.6	.4	.4	15	13	13
Netherlands...	.3	.2	.2	14	9	8
Total EEC....	4.1	3.1	2.8	165	154	140
Total Western Europe ^b	7.3	5.5	5.1	234	215	198
Czechoslovakia	1.1	.8	.7	36	30	26
East Germany.	2.1	1.8	1.6	70	76	58
Poland.....	11.6	10.6	10.6	291	335	340
Total Eastern Europe ^b	16.2	14.2	13.8	422	460	443
U.S.S.R.....	40.3	30.3	28.4	525	500	467
World ^b	69.6	55.3	53.1	1,266	1,259	1,204

n.a. = not available.

^a1969 figures subject to revision.

^bIncludes countries not shown separately.

Source: *Foreign Agriculture Circular*, April 1970, Foreign Agricultural Service, United States Department of Agriculture.

Europe with 443 million bushels had almost 37 per cent; Western Europe with 198 million bushels had more than 16 per cent; North America had about four per cent and South America, one per cent.

The U.S.S.R. crop of 467 million bushels in 1969 was 11 per cent less than the annual average of 525 million bushels in the 1960-64 period. The 1969 crop

was also smaller than the 1968 crop, partly because a severe winter caused some substitution of spring grains for rye. In the U.S.S.R., spring rye acreage exceeds winter acreage. In Poland, the second largest producer of rye, almost all the rye is planted in the fall. This is one of the few countries where the rye acreage still exceeds that of wheat. In 1969, Poland's rye crop was 340 million bushels, up slightly from the 335 million bushels produced in 1968, and 16 per cent higher than the 1960-64 average of 291 million bushels. Rye acreage in Poland remained steady at 10.6 million acres in 1968 and 1969. Poland has not followed the general world trend toward reduction in rye production. Other important Eastern European rye-producing countries, particularly East Germany and Czechoslovakia, had much smaller rye crops in 1969 compared with 1960-64. In the European Economic Community (EEC), production in 1969, at 140 million bushels, was down by about ten per cent from the preceding year and by 15 per cent from 1960-64, even with 1969 yields more than 20 per cent higher than the 1960-64 level. Within the EEC, West Germany is the main producer of rye, with more than 80 per cent of the total in 1969. Elsewhere in Europe, Austria produced 17 million bushels and Spain, 13 million bushels in 1969.

The United States crop, most of which was planted in 1968 and harvested in 1969, produced 31.4 million bushels, 36 per cent more than the 1968 harvest, although slightly below the post-war peak production of the early 1960's. Argentina produced 13.7 million

bushels in 1969, slightly less than Canada's production in that year.

World trade in rye was highest, in recent years, in 1962 when world exports amounted to about 83 million bushels (Table 2). By 1969, exports decreased to about 12 million bushels and further reductions are expected in 1970. Exports from the main exporting countries, Canada, the U.S. and Argentina, were much lower in 1969 than in 1968; however, the Netherlands' exports almost tripled from 1968 to 1969, making the Netherlands the largest exporter in 1969. Stocks of rye on hand in the four main rye-exporting countries (Canada, the United States, Argentina and the U.S.S.R.) are somewhat higher than in recent years, at 63 million bushels at the beginning of 1970, but are not as high as in the late 1950's.

Average prices of rye in Canada (No. 2 C.W. in store, Thunder Bay) and the United States (Minneapolis No. 2) were at a high level of more than \$2 a bushel in the immediate post-war period, but decreased in the 1950's. Some recovery occurred in the early 1960's with Canadian prices for five years in the \$1.30 to \$1.40 range. In the last five years of the 1960's, Canadian monthly prices (Table 3) ranged between \$1.20 and \$1.40. Prices at both Minneapolis and Thunder Bay decreased in the early months of 1970, with Minneapolis prices at US\$1.15 to US\$1.18 in late May compared with US\$1.22 to US\$1.26 a year earlier. Canadian prices in the 1969-70 crop year have been declining and in early June 1970, were only about Can\$1 a bushel compared with Can\$1.33 in June 1969.

TABLE 2—WORLD EXPORTS OF RYE, BY COUNTRY OF ORIGIN, SELECTED COUNTRIES, 1961 TO 1969

Country of origin	1961	1962	1963	1964	1965	1966	1967	1968	1969
million bushels									
Canada.....	4.9	6.9	4.4	5.9	4.5	9.6	8.1	5.3	2.6
United States.....	8.6	15.6	14.6	5.6	2.3	4.2	4.0	1.9	1.0
Argentina.....	1.6	.4	.1	4.4	3.8	.2	.1	.8	.5
European Economic Community									
France.....	.5	.1	.4	.9	1.0	.8	.6	1.2	1.2
West Germany.....	7.9	.4	.2	.2	.2	.7	.4	.1	—
Netherlands.....	.3	1.1	1.3	.4	.3	.1	.7	1.0	2.9
Sweden.....	2.2	3.1	.7	.1	.5	.7	.1	.9	1.1
Eastern Europe ^a	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.1	1.8	1.4
U.S.S.R.....	42.8	51.2	32.1	5.9	1.4	10.8	13.2	8.7	.4
Total.....	72.2 ^b	83.2 ^b	60.2 ^b	26.4 ^b	18.0 ^b	29.8 ^b	21.3 ^c	21.7 ^c	11.1 ^c

— = none reported

n.a. = not available

^a Excluding the U.S.S.R.

^b Includes exports from countries not specified.

^c Includes only these countries specified and therefore does not represent total trade in rye.

Sources: Commonwealth Secretariat publications.

CANADIAN SITUATION

Canada, the seventh largest producer of rye in 1969-70, produced about 16.5 million bushels on 927,000 acres (Table 4). This was a 30 per cent increase in production from 1968-69 and a 56 per cent increase from the average production in the 1960-61 to 1964-65 period. Acreage increases were also large—50 per cent from the 1960-61 to 1964-65 period to 1969-70. However, the 1969-70 average yield, at approximately 18 bushels per acre, was down slightly from the 1968-69 yield of 19 bushels per acre.

Acreage and production in recent years, however, have been far smaller than the acreage and production of the late 1940's or early 1950's. The highest acreage recorded in Canada was 2.4 million acres in 1948-49. The highest production, 32.4 million bushels, was in 1922-23.

Of the 16.5 million bushels of rye produced in

Canada in 1969-70, 89 per cent was grown in the Prairie Provinces. Saskatchewan was the leading producer with 7.8 million bushels, 47 per cent of total Canadian production. Next was Manitoba with 2.5 million bushels or 21 per cent, and then Alberta with 2.4 million bushels, also about 20 per cent of the total. Ontario grew 1.6 million bushels of rye in 1969-70, almost ten per cent of the Canadian total. The only other provinces reporting rye production were British Columbia and Quebec. Each of these two provinces supplied less than one per cent of the total Canadian production.

Production has shown a slight upward trend in the Prairie Provinces during the last ten years, although there have been year-to-year fluctuations. In Ontario, production decreased from an average of 1.6 million bushels in the 1958-59 to 1962-63 period to an average of 1.4 million in the next five years and then increased slowly to 1.6 million bushels in 1969-70. Production in both Quebec and British Columbia was slightly higher in 1969 than in 1968.

TABLE 3—RYE, MONTHLY AND YEARLY AVERAGE PRICES, NO. 2 C.W., BASIS IN STORE THUNDER BAY

Month	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
	cents per bushel					
August.....	133	124	134	131	116	117
September.....	137	123	131	126	120	118
October.....	130	124	136	126	120	115
November.....	126	123	128	126	119	113
December.....	125	126	132	126	118	109
January.....	124	136	120	130	123	111
February.....	126	137	133	135	127	111
March.....	125	129	137	138	126	107
April.....	121	129	137	132	132	104
May.....	210	125	137	128	134	102
June.....	120	131	135	121	133	n.a.
July.....	119	135	138	119	124	n.a.

n.a. = not available.

Source: *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

TABLE 4—RYE PRODUCTION AND ACREAGE, CANADA, BY PROVINCE, AVERAGE 1958-59 TO 1962-63 AND 1963-64 TO 1967-68, ANNUAL 1968-69 AND 1969-70.

	Production				Acreage			
	Average 1958-59 to 1962-63	Average 1963-64 to 1967-68	1968-69	1969-70	Average 1958-59 to 1962-63	Average 1963-64 to 1967-68	1968-69	1969-70
			Total	Percentage of total			Total	Percentage of total
	thousand bushels			per cent	thousand acres			per cent
Quebec.....	104	95	104	112	5	4	4	.5
Ontario.....	1,600	1,372	1,435	1,572	67	53	52	6.5
Manitoba.....	1,681	2,593	2,500	3,358	87	121	120	19.7
Saskatchewan..	3,370	6,760	6,500	7,800	260	358	385	53.5
Alberta.....	2,220	3,736	2,400	3,500	141	183	114	19.4
British Columbia	53	72	110	151	2	2	3	.4
Canada.....	9,028	14,628	13,049	16,493	562	721	679	100.0

Sources: (1) *Handbook of Agricultural Statistics, Part 1—Field Crops*, 1908-1963, Cat. No. 21-507, Dominion Bureau of Statistics.

(2) *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

TABLE 5—RYE: SUPPLY AND DISPOSITION, CANADA, AVERAGE 1957-58 TO 1961-62 AND 1962-63 TO 1966-67, ANNUAL 1968-69 AND 1969-70

	Average 1957-58 to 1961-62	Average 1962-63 to 1966-67	1968-69	1969-70
	thousand bushels			
Stocks at August 1.	9,162	6,813	7,458	8,446
Production.....	8,255	14,682	13,049	16,493
Imports.....	17	53	—	n.a.
Total Supply.....	17,434	21,548	20,507	24,939
Exports.....	4,032	7,136	4,248	n.a.
Domestic Consumption				
Human food.....	429	449	450	n.a.
Seed requirements	662	838	1,065	n.a.
Industrial use....	1,231	1,661	2,600	n.a.
Loss in handling.	159	59	n.a.	n.a.
Animal feed, wastage and dockage.....	3,633	3,689	3,698	n.a.
Total.....	6,114	6,697	7,813	n.a.
Stocks at July 31...	7,288	7,715	8,446	n.a.

— = none reported.

n.a. = not available.

Source: Agriculture Division, Dominion Bureau of Statistics.

Stocks of rye in Canada (Table 5) have not been excessive in recent years and the 8.4 million bushels carryover at July 31, 1969 to start the 1969-70 crop year was only slightly greater than stocks in the last two years, and well below the 22 million bushels in the peak year of 1953-54. The slight increase in stocks, combined with higher production in 1967-68 and 1968-69, pushed available supplies for 1969-70 to a level about 4.4 million bushels greater than 1968-69 supplies.

Rye in Canada is not marketed by the Canadian Wheat Board, but unlike the other grains not marketed by the Board (flax and rapeseed), rye comes

under the specified acreage quota and the unit quota for delivery purposes, with one unit equalling six bushels of rye, the same as barley.

Canada's exports of rye (Table 6) have decreased sharply in recent years and in 1969-70, appear likely to reach the lowest level since 1960-61. With only about two months left in 1969-70 crop year, exports, at 2.2 million bushels, were almost 20 per cent less than the 2.7 million bushels exported at the same time last year. In the peak export year of 1953-54, exports were almost 17 million bushels and as recently as 1967, exports reached eight million bushels.

In early 1960's, the principal recipients of Canadian rye exports were the Netherlands and West Germany. Sizeable sales continued to the Netherlands until 1968. Sales to Japan in 1967 reached almost four million bushels, but have been intermittent and decreased sharply in 1969. Some sales to the United States were made throughout the 1960's but these have tapered off since the 2.6 million bushels exported in 1964.

Domestic use of rye in 1968-69 decreased to 7.9 million bushels from 9.5 million bushels in 1966-67 and 1967-68, but was equal to or higher than any year since 1942-43. The main use of rye was livestock feed. The quantity of rye shipped under Feed Freight Assistance reached about 1.2 million bushels in 1967-68, but decreased to less than 700,000 bushels in 1968-69. In the early months of 1969-70, the amount of rye moving with freight assistance was much less than in the similar period the year before.

The second most significant domestic use for rye is the distilling industry which, for the last two years, has taken about 2.6 million bushels annually and this volume has been growing gradually over many years. The amount of rye used for human food changed little in the past decade and in 1968-69 amounted to 450,000 bushels.

TABLE 6—CANADIAN RYE EXPORTS BY RECIPIENT COUNTRY, 1962 TO 1969

Recipient Countries	1962	1963	1964	1965	1966	Average 1962-66	1967	1968	1969
	million bushels								
United Kingdom.....	.2	.4	.1	.3	.4	.3	.3	.5	.5
European Economic Community									
Belgium-Luxembourg.....	.5	.5	.1	.1	.2	.3	.1	—	—
Netherlands.....	2.4	2.3	3.1	.8	2.0	2.1	1.3	.2	.5
West Germany.....	4.3	1.3	1.4	a	.5	1.5	.2	—	a
Total EEC.....	7.2	4.1	4.6	.9	2.7	3.9	1.6	.2	.5
Norway.....	.2	1.0	.8	.3	1.7	.8	.8	1.1	—
Japan.....	.3	.1	.1	1.6	2.7	.9	4.0	2.8	1.0
United States.....	1.4	1.2	2.6	1.5	2.1	1.7	1.0	.6	.5
Other Countries.....	.2	a	.1	a	a	.1	.4	.1	.1
Total.....	9.5	6.8	8.3	4.6	9.6	7.7	8.1	5.3	2.6

— = none reported.

a Less than 50,000 bushels.

Source: *Trade of Canada, Exports by Commodities*, Cat. No. 65-004, Dominion Bureau of Statistics.

OUTLOOK

Western European rye production is expected to be lower in 1970 than in 1969, as lower acreages have been reported from several countries, including France and Spain. Rye planted in the United States in the fall of 1969 amounted to 4.4 million acres, up by eight to nine per cent from the previous year. However, about two-thirds of rye acreage in the U.S. usually is used as pasture. Although closing stocks at the end of the U.S. 1968-69 crop year were down from 18 million bushels to about 16 million bushels (about one-third of available supplies), increased production would change this situation and lead to some increased supply, with the probability of increased competition for available export markets. There is no indication of any reversal in the decline in world demand for rye.

In Canada, the area planted to rye, in the fall of 1969 was 865,000 acres, five per cent more than in 1968. Coupled with the 135,000 acres of rye planted in the spring of 1970, resulting production for 1969-70 is likely to equal or be greater than the 16.5 million bushels produced in 1968-69. Food and industrial use are likely to be about the same for the crop year 1969-70 as for the previous year. However, exports are likely to be at least one-half million bushels less than in 1968-69, and the use of rye as feed for livestock is also less than last year, so that total disposition might not exceed ten million bushels out of the 25 million bushels available. Carryover and production in the crop year 1970-71 would thus

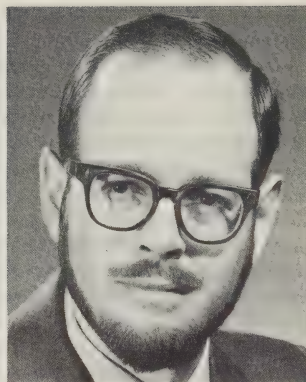
increase 1970-71 supplies to about 30 or 31 million bushels.

The future prospects for rye as an export crop are not good. With decreasing world demand, exports are not likely to regain levels of past years. The regular but small demand for rye for distilling and human food in Canada will remain at the present level or increase only slightly. Rye crops on light land, in Western Canada particularly, have some natural advantages; however, the price spread between rye and other feed grains has altered, particularly in recent months. Rye traditionally sold at a premium over barley. In the five-year period ending 1966-67, rye prices averaged \$1.34 a bushel (for No. 2 C.W.) while the price of No. 1 feed barley averaged \$1.22 a bushel. By the end of crop year 1968-69, barley prices dropped to 98 cents a bushel, but rye was still at \$1.24. In 1969-70, continued competition forced the price of rye down and in June 1970, rye was selling at 7 cents less than barley—98 cents a bushel for rye compared with \$1.05 for barley. To some extent, this may represent a change in the demand pattern between barley and rye. While prices may have over-reacted at this particular time, the prospects for rye are indeed rather poor, particularly in view of the fact that barley yields in Western Canada are approximately double those of rye. Nevertheless, on some poorer land, rye does better than wheat or barley, or at least is more certain and may continue to have a role in these areas, subject to the limited demand and changed price relationships.

MUSTARD SEED PRODUCTION

R. T. Miller

...Canada is the world's largest exporter of mustard seed... the main markets for this crop are the EEC, the United States and Japan. . . . the author predicts that these markets will continue to import large quantities of Canadian mustard seed . . .



Acreage

Mustard seed, in its wild state, is a primary noxious weed common to most parts of Canada. It was first produced on a commercial basis in this country in 1936, when about 100 acres were planted in southern Alberta. By 1960, mustard seed was being produced in all three Prairie Provinces on an acreage in excess of 130,000 acres. In 1968, a record year for mustard seed production in Canada, the total area sown was 533,000 acres (Table 1).

Until 1959, Alberta had a virtual monopoly on the production of Canadian mustard seed. In 1955-59, Alberta's average annual acreage of mustard seed was about 95,000 acres, 99 per cent of the mustard seed acreage in Canada. In the 1960-64 period, the average annual acreage in Alberta fell to 59,640 acres and the province's share of total acreage was reduced to about half. In the most recent five-year period, 1965-69, average acreage

rose to about 94,000 acres, slightly less than the 1955-59 average. Alberta's share of total acreage decreased from 55 per cent in 1955-59 to 34 per cent in 1965-69. In 1969, Alberta's mustard seed acreage, at 50,000 acres, was less than 20 per cent of the total Canadian acreage.

The relative decline of Alberta as the main mustard-producing province began in 1960, the year that Saskatchewan began cultivation of mustard seed on a large scale. From 15,600 acres in 1960, Saskatchewan increased production to 180,000 acres in 1969 to become Canada's largest producer of mustard seed with more than two-thirds of the total acreage. Although Manitoba has been producing mustard seed in commercial quantities since 1952, the area planted to this crop has never been more than about 20 per cent of the national total. In 1969, Manitoba seeded 37,000 acres or about 14 per cent of the Canadian total.

TABLE 1—MUSTARD SEED ACREAGE, BY PROVINCE, CANADA, 1951 TO 1969

Year	Canada	Manitoba		Saskatchewan		Alberta	
	Acres	Acres	Percentage of total	Acres	Percentage of total	Acres	Percentage of total
Average 1951-54.....	49,662	450	.9	—	—	49,212	99.1
Average 1955-59.....	95,143	323	.3	—	—	94,820	99.7
1960.....	131,050	450	.3	15,600	11.9	115,000	87.8
1961.....	120,800	10,800	8.9	40,800	33.8	67,200	57.3
1962.....	90,000	17,000	18.9	39,000	43.3	34,000	37.8
1963.....	126,000	27,000	21.4	54,000	42.9	45,000	35.7
1964.....	76,000	12,000	15.8	29,000	38.2	35,000	46.0
Average 1960-64.....	108,770	13,450	12.4	35,680	32.8	59,640	54.8
1965.....	156,000	28,000	17.9	58,000	37.2	70,000	44.9
1966.....	200,600	31,500	15.7	81,200	40.5	87,900	43.8
1967.....	221,000	29,000	13.1	78,000	35.3	114,000	51.6
1968.....	533,000	65,000	12.2	320,000	60.0	148,000	27.8
1969.....	267,000	37,000	13.9	180,000	67.4	50,000	18.7
Average 1965-69.....	275,520	38,100	13.8	143,440	52.1	93,980	34.1

— = none reported.

Sources: *Handbook of Agricultural Statistics, Part 1—Field Crops*, Cat. No. 21-507, and *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

TABLE 2—MUSTARD SEED PRODUCTION, BY PROVINCE, CANADA, 1951 TO 1969

	Canada	Manitoba		Saskatchewan		Alberta	
			Percentage of total		Percentage of total		Percentage of total
	thousand pounds	thousand pounds		thousand pounds		thousand pounds	
Average 1951-54	21,495	334	1.6	—	—	21,161	98.4
Average 1955-59	74,701	209	.3	—	—	74,492	99.7
1960	57,715	315	.6	7,400	12.8	50,000	86.6
1961	37,500	4,100	10.9	17,100	45.6	16,300	43.5
1962	50,100	10,700	21.4	21,400	42.7	18,000	35.9
1963	107,500	20,200	18.8	51,300	47.7	36,000	33.5
1964	49,700	8,700	17.5	18,000	36.2	23,000	46.3
Average 1960-64.....	60,503	8,803	14.5	23,040	38.1	28,660	47.4
1965	122,700	23,800	19.4	46,400	37.8	52,500	42.8
1966	165,400	17,300	10.5	69,000	41.7	79,100	47.8
1967	149,900	20,300	13.6	52,650	35.1	76,950	51.3
1968	469,000	55,000	11.7	288,000	61.4	126,000	26.9
1969	258,000	30,000	11.6	178,000	69.0	50,000	19.4
Average 1965-69.....	233,000	29,280	12.6	126,810	54.4	76,910	33.0

— = none reported.

Sources: *Handbook of Agricultural Statistics, Part 1—Field Crops*, Cat. No. 21-507, and *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

Production

Average annual production of Canadian mustard seed in 1965-69 was 233 million pounds (Table 2), more than three and a half times the average annual crop during the previous five-year period. All three Prairie Provinces recorded substantial production increases during this period; however, the rate of increase was not as great in Manitoba and Alberta as it was in Saskatchewan. Share of total production declined in both the former provinces while it rose in the latter. In 1969, Saskatchewan produced 178 million pounds of mustard seed, more than two-thirds of the Canadian crop. In the same year, production in Alberta and Manitoba amounted to 19.4 and 11.6 per cent, respectively, of the total mustard seed crop.

In the past ten years, the average annual yield for mustard seed in the three Prairie Provinces increased by about 50 per cent from an average of 556 pounds an acre in 1960-64 to 846 pounds in 1965-69 (Table 3). In more recent years, average yields have tended to be somewhat higher in Alberta and Saskatchewan than in Manitoba. In 1969, for example, both the former provinces had average yields of approximately 1,000 pounds an acre. In Manitoba, however, the average yield was only slightly more than 800 pounds. The reason for this difference is partially explained by the type of mustard seed grown in each province. The brown and oriental mustard seed types (*Brassica juncea*) which have higher yields

TABLE 3—MUSTARD SEED: YIELD PER ACRE, PRODUCTION, AVERAGE FARM PRICE AND TOTAL FARM VALUE, CANADA, AVERAGE 1951-54, 1955-59 AND ANNUAL 1960 TO 1969

Crop Year	Average Yield per Seeded Acre	Total Production	Average Farm Price	Total Farm Value
	pounds	thousand pounds	cents per pound	thousand dollars
Average 1951-1954.....	433	21,495	4.6 ^a	1,062 ^a
Average 1955-1959.....	785	74,701	3.8	2,822
1960.....	440	57,715	3.8	2,169
1961.....	310	37,500	3.6	1,355
1962.....	557	50,100	4.0	1,984
1963.....	853	107,500	4.1	4,435
1964.....	654	49,700	4.0	3,003
Average 1960-1964.....	556	60,503	3.9	2,389
1965.....	787	122,700	4.7	5,763
1966.....	825	165,400	4.7	7,695
1967.....	678	149,900	5.1	7,580
1968.....	880	469,000	n.a.	n.a.
1969.....	966	258,000	n.a.	n.a.
Average 1965-1969.....	846	233,000	n.a.	n.a.

n.a. = not available.

^a 1953-54 average only: farm value for 1951 and 1952 is not available.Sources: *Handbook of Agricultural Statistics, Part 1—Field Crops*, Cat. No. 21-507, and *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

TABLE 4—MUSTARD SEED ACREAGE, BY TYPE, CANADA AND PRAIRIE PROVINCES, 1969

Type	Canada		Manitoba		Saskatchewan		Alberta	
	Acreage	Percentage	Acreage	Percentage	Acreage	Percentage	Acreage	Percentage
	thousand acres		thousand acres		thousand acres		thousand acres	
Yellow mustard.....	101.1	37.9	28.8	77.8	55.8	31.0	16.5	33.0
Brown mustard.....	121.4	45.4	5.6	15.2	100.8	56.0	15.0	30.0
Oriental mustard.....	44.5	16.7	2.6	7.0	23.4	13.0	18.5	37.0
Total.....	267.0	100.0	37.0	100.0	180.0	100.0	50.0	100.0

Sources: *Coarse Grains Quarterly*, Cat. No. 22-001, November 1969, Dominion Bureau of Statistics.

than yellow mustard, predominate in Alberta and Saskatchewan, but Manitoba maintains a preference for yellow mustard (*Brassica hirta*).

Traditionally, yellow mustard (*Brassica hirta*) comprised 50 per cent or more of the total mustard crop. Although this production pattern still holds in Manitoba, in recent years, there has been a substantial shift toward increased production of the brown and oriental mustard types (*Brassica juncea*) in both Alberta and Saskatchewan (Table 4). In 1969, production of brown mustard seed accounted for more than 45 per cent of the Canadian crop, but production of yellow mustard seed represented only about 38 per cent. Approximately 100,000 acres were sown to brown mustard seed in Saskatchewan, more than 50 per cent of the total acreage in that province. In both Alberta and Saskatchewan, the brown and oriental types accounted for about two-thirds of the mustard seed grown. This is in sharp contrast to Manitoba where more than three-quarters of the crop planted was yellow mustard. Demand for brown mustard comes mainly from several European countries, while Japan provides a continuing market for Canadian mustard of the oriental type.

Contracts

It is estimated that between 90 and 95 per cent of the western mustard seed crop is grown under contract. Production of the balance of the crop is speculative, in that it is grown without a contract. Contracts are provided by a number of firms who usually provide or specify the type of seed to be used. Contract prices for the current year, at 3.5 to 4 cents a pound for No. 1 C.W. Yellow mustard, are somewhat less than those offered in 1969. Brown and oriental mustard seed are currently attracting prices which range between 2 and 2.75 cents a pound. These are the prices which are offered to established growers: new growers may receive one-half cent a pound less. The crop is eventually marketed through the regular grain-handling facilities by the contracting firms. The production of mustard under contract tends to provide the individual producer with a

return which is somewhat higher than he might receive were he to produce without one. Contracting permits the production of appropriate types of seed in direct response to the demands of particular markets, and, at the same time, keeps supplies within marketable limits.

Uses of Mustard Seed

All three types of mustard seed are used in the manufacture of "wet" or prepared mustard. They differ somewhat in pungency and aroma. Brown and oriental mustard seed are normally used to produce the milder mustard preparations while the hotter, more pungent preparations are obtained from yellow mustard seed. Mustard preparations used in North America usually contain a mixture of both yellow and brown mustards. Various combinations of the two produce a range of preparations which differ both in pungency and quality.

Although oriental mustard, which is a yellow-seeded form of the brown type, may be used in the production of prepared mustard, it is also widely used in the manufacture of mustard flour. Mustard flour is used to some extent as a constituent of dry ground spice or seasoning mixtures. It is also used to a minor extent as an irritant or rubefacient in medicinal products. Mustard seed may also be crushed to produce an edible oil. Oriental mustard seed is the most preferred for crushing since it yields more oil than the seeds of the yellow and brown types. Mustard seed is not crushed in Canada.

Although mustard seed is most easily recognized in its prepared form as a table condiment, it is also used in a wide variety of other food preparations; for example, as a seasoning ingredient in such preparations as catsup, pickles, relishes, salad dressings, mayonnaise, curry powder and condiment sauces. In recent years, it has gained favor with many meat packers as a filler for various types of sausage meats.

World Trade in Mustard Seed

Mustard seed is grown in many countries of the world, however, statistics are lacking. Statistics on

consumption, exports, imports and re-exports, if any, are not reported by some producing countries. In many cases, mustard seed statistics do not appear separately but are included with other oilseeds.

Tables 5 and 6 give some indication of the extent and growth of world trade in mustard seed in recent years. Canada is by far the largest exporting country. In 1966, Canada exported more than two and one-

TABLE 5—EXPORTS OF MUSTARD SEED FROM SELECTED COUNTRIES, 1960 TO 1966

	1960	1961	1962	1963	1964	1965	1966
	thousand long tons ^a						
Canada	11	13	12	21	24	22	45
Denmark	9	17	9	8	8	7	10
Ethiopia	—	—	2	2	n.a.	n.a.	n.a.
Italy	2	2	1	1	1	1	1
Netherlands ..	2	2	2	3	3	4	7

— = nil, or less than 500 long tons.

n.a. = not available.

^aOne long ton contains 2,240 pounds.

Source: *Vegetable Oils and Oilseeds Review*, Commonwealth Secretariat, London.

TABLE 6—IMPORTS OF MUSTARD SEED BY SELECTED COUNTRIES, 1960 TO 1966

	1960	1961	1962	1963	1964	1965	1966
	long tons ^a						
Belgium	1	2	1	1	3	3	1
France	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10
West Germany ..	10	7	8	8	10	9 ^b	11
Japan	4	4	5	7	6	7	6
Netherlands ..	2	3	2	3	4	4	10
United States ..	13 ^c	19 ^c	11 ^c	13	10	14	23

^a One long ton contains 2,240 pounds.

^b Partly estimated.

^c Taken from *United States Foreign Agricultural Trade by Countries, Calendar Year 1962*, Economic Research Service, United States Department of Agriculture, Washington, D.C.

Source: *Vegetable Oils and Oilseeds Review*, Commonwealth Secretariat, London.

half times as much mustard seed as all the other exporting countries combined. In recent years, Canada has also experienced the largest rate of growth in exports of any of the countries involved. Denmark and the Netherlands are the next largest suppliers of mustard seed for export; however, in 1966, exports from both those countries combined amounted to little more than one-third of the Canadian total. On the import side, countries of the European Economic Community comprise the largest single market for mustard seed. At the same time, this market has also experienced the largest rate of growth. Both the United States and Japan provide

TABLE 7—MUSTARD SEED PRODUCTION, EXPORTS, NET DOMESTIC AVAILABILITY, VALUE OF EXPORTS, 1957 TO 1969

	Pro- duction	Exports	Exports as a Per- centage of Pro- duction	Net Domestic Avail- ability ^a	Value of Exports
	thousand pounds	per cent	thousand pounds	thousand dollars	
Average 1957-59 ..	63,516	57,094	89.9	6,422	2,827
1960	57,715	46,707	80.9	11,008	2,604
1961	37,500	28,471	75.9	9,029	1,775
1962	50,100	26,762	53.4	23,338	1,740
1963	107,500	46,072	42.9	61,428	2,725
1964	49,700	52,755	106.1	-3,055	2,926
Average 1960-64 ..	60,503	40,153	66.4	20,350	2,354
1965	122,700	73,877	60.2	48,823	4,656
1966	165,400	101,191	61.2	64,209	6,176
1967	149,900	137,718	91.9	12,182	7,968
1968	469,000	131,597	28.1	337,403	8,661
1969	258,000	134,143	52.0	123,857	8,247
Average 1965-69 ..	233,000	115,705	49.7	117,295	7,142

^a Production less exports equals net domestic availability.

Sources: *Handbook of Agricultural Statistics, Part 1—Field Crops*, Cat. No. 21-507; *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003; and *Trade of Canada, Exports*, Cat. No. 65-004, Dominion Bureau of Statistics.

markets which, although somewhat smaller in size than the EEC, show considerable potential for growth.

In each of the past three years, exports of Canadian mustard seed have exceeded 130 million pounds (Table 7). The average annual figure for the five-year period 1965-69 was more than 115 million pounds. This is almost three times the average exports of 40 million pounds in 1960-64 and double the average exports for the period 1957-59.

The United States produces only a fraction of its mustard seed requirements and therefore imports large quantities each year from Canada. During the past four years, the United States has been Canada's largest market taking an average of 63.6 million pounds a year, about half of all Canadian mustard seed exports (Tables 8 and 9). The EEC provides Canada with its second largest market, taking slightly more than a third of total mustard seed exports. Canadian exports to the EEC have more than doubled in the past six years from 23.3 million pounds in 1964 to almost 53 million pounds in 1969. Japan is Canada's third principal market, importing more than 18 million pounds in both 1968 and 1969, representing about 14 per cent of total exports. The

TABLE 8—MUSTARD SEED EXPORTS FROM CANADA BY COUNTRY OF DESTINATION,
AVERAGE 1963-67, ANNUAL 1964 TO 1969

	Average 1963-67	1964	1965	1966	1967	1968	1969
	thousand pounds						
United Kingdom.....	3,520	2,218	6,417	4,032	1,568	2,082	—
European Economic Community							
Belgium-Luxembourg.....	9,341	9,756	9,431	6,159	15,836	15,030	19,113
West Germany.....	6,182	4,763	4,237	6,320	13,642	16,661	8,473
Netherlands.....	12,096	8,695	15,677	20,643	10,842	15,583	25,148
France.....	331	—	—	1,653	—	—	—
Italy.....	62	66	78	88	—	—	—
Total EEC.....	28,013	23,281	29,423	34,864	40,320	47,275	52,734
Switzerland.....	511	189	710	668	780	—	—
Austria.....	—	—	—	—	—	225	—
Sweden.....	22	5	—	66	40	7	—
Australia.....	—	—	—	—	—	5	20
Japan.....	12,761	10,701	12,633	13,439	14,533	18,722	18,133
Israel.....	12	—	—	40	19	—	—
Trinidad and Tobago.....	6	—	—	14	9	—	8
Mexico.....	—	—	—	—	—	102	150
Cuba.....	—	—	—	—	—	—	24
Argentina.....	—	—	—	—	—	110	—
Peru.....	39	22	46	33	93	36	—
United States.....	37,439	16,338	24,648	48,035	80,355	63,032	63,072
Total.....	82,323	52,755	73,877	101,191	137,718	131,597	134,142

— = none reported.

Source: *Trade of Canada, Exports*, Cat. No. 65-004, Dominion Bureau of Statistics.

TABLE 9—CANADIAN MUSTARD SEED EXPORTS TO
PRINCIPAL MARKETS AS A PERCENTAGE OF TOTAL
EXPORTS, AVERAGE 1963-67, ANNUAL 1964 TO 1969

	Average 1963-67	1964	1965	1966	1967	1968	1969
	per cent						
United States.....	45.5	31.0	33.4	47.5	58.3	47.9	47.0
EEC.....	34.0	44.1	39.8	34.4	29.3	35.9	39.3
Japan.....	15.5	20.3	17.1	13.3	10.6	14.2	13.5
All others.....	5.0	4.6	9.7	4.8	1.8	2.0	.2
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: *Trade of Canada, Exports*, Cat. No. 65-004, Dominion Bureau of Statistics.

balance of Canadian exports in 1969, 200,000 pounds, went to four other countries with Mexico taking three-quarters of it.

OUTLOOK FOR CANADIAN MUSTARD SEED

Production

Early unofficial estimates of the 1970 mustard seed crop in Western Canada place the total area seeded at about 210,000 acres, more than 20 per cent less than the 1969 total. Acreage reductions are forecast for all three Prairie Provinces. Yellow mustard is expected to form a larger proportion of the 1970 crop than in 1969.

Saskatchewan is expected to remain the largest producer, with about 155,000 acres of mustard seed, approximately 14 per cent less than in 1969. Since yields are also expected to be lower this year, production should be substantially less than in 1969.

The total estimated area sown to mustard seed in Manitoba, 30,000 acres, is about 19 per cent less than the 1969 total; however, higher yields are expected and total production may approach the 1969 level. Yellow mustard will form a substantial proportion of the crop again this year.

In Alberta, total mustard seed acreage is expected to be only half the 1969 total at 25,000 acres. The area sown to brown mustard should remain unchanged with yellow mustard making up the balance. Apparently there is little interest in production of oriental mustard this year. Yields in Alberta are expected to be higher this year than in 1969.

Exports

On the basis of statistics presently available, it appears that total exports of Canadian mustard seed for the 1969-70 crop year ending July 31 will be about 140 million pounds. This is about 10 per cent less than the 157 million pounds exported during the 1968-69 crop year.

It is expected that the United States, Japan and the EEC will continue to be the main markets for Canadian mustard seed.

POLICY AND PROGRAM DEVELOPMENTS

Prince Edward Island Crop Insurance Amendments—Recent amendments to the P.E.I. Crop Insurance Agreement revised the method of determining the level of coverage for each farmer under the spring grain plan, and revised the premium rates required to sustain the plan.

Under the spring grain plan, a farmer's insurance coverage is now based on his past production records, rather than on an average production for the province. A maximum yield is established to be used by those farmers with inadequate production records. Another change in the spring grain plan allows farmers to purchase insurance at either 60, 70 or 80 per cent of their average yield.

Premium discounts for cash payment of premiums, for consecutive years without a claim and for the insurance of large acreages were also introduced in these amendments.

The minimum participation rates required for federal government contribution were lowered to 50 farmers for insurance of potato crops and to 100 farmers for grain insurance.

The premium rates are to be such that crop insurance plans will be self-sustaining, and the federal government will pay 25 per cent of the premium required to fulfill this condition. The federal government will also reimburse the province for one-half of the administrative costs of the plan. (June 2, 1970)

British Columbia Crop Insurance Amendments—Changes were made in each of the four British Columbia crop insurance plans—tree fruits, berries, grapes and grain crops.

Amendments to the *tree fruits* plan increased the

premium rates for insurance of trees against loss by winter-kill and lowered the amount "deductible" from indemnity payments from six per cent to three per cent.

The level of coverage for *berry crops* (except strawberries) was increased from 70 to 80 per cent. Premium rates for strawberry crop loss and plant loss insurance were increased by about 30 per cent, but provision was made for premium adjustments in the case of acreage abandoned because of damage by winter-kill.

For *grape vine* loss, indemnity payments were increased by approximately ten per cent, because of the increased costs of replacing damaged vines.

Under the *grain crop* insurance plan, provision was made for guaranteeing the quality of grain insured, according to a schedule of grades and prices. There was an increase of about 30 per cent in premium rates for grain crops because of the losses incurred in the first two years of operation of this crop insurance scheme. However, the discounts for insured farmers who had no claims for two or three consecutive years were increased.

Premium rates are to be such that the plan is self-sustaining. The federal government will pay 25 per cent of the premiums and 50 per cent of the administrative costs. (June 2, 1970)

Ontario Wheat Producers' Marketing Order—The Ontario Wheat Producers' Marketing Board is authorized to collect levies of not more than 28 cents a bushel of wheat marketed from July 1, 1970 to June 30, 1971. For the crop year ending June 30, 1970, the levy was 20 cents a bushel. (June 25, 1970)

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

The Structure of the Canadian Agricultural Labor Force, A. B. Andarawewa, Research Division, Economics Branch, Canada Department of Agriculture, Ottawa, April 1970, Pub. No. 70/6. pp. vi + 50.

This study presents historical trends in the numbers and characteristics (both demographic and economic) of the national and regional labor force. It includes data on the changes in agricultural inputs and on agricultural development, with projections to 1980. The period covered by the study is from 1946 to 1968 for most factors, but data from 1931 to 1968 is included for some of the main factors.

Canadian Agricultural Mid-Year Outlook, Outlook Section, Marketing and Trade Division, Economics Branch, Canada Department of Agriculture, Ottawa, May 1970. pp. vi + 75.

This publication contains analyses of the situation and outlook for wheat, feed grains, oilseeds, dairy products, fruit, vegetables, sugar beets, poultry, hogs and beef cattle.

Agricultural Economics Research Information System (AERIS), Report No. 1, Economics Branch, Canada Department of Agriculture, Ottawa, July 1970, Pub. No. 7/10. pp. ii + 41.

AERIS was established to provide information on agricultural economics research in Canada. This first report contains the information derived from a survey of public and private research agencies on their work in this field. The type of projects being done, the expected term of projects, and the man-years and funds required are listed for the research projects.

UNITED NATIONS PUBLICATIONS

Available in Canada from the Queen's Printer, Ottawa

The Power of Food, A Progress Report on the World Food Program, Food and Agriculture Organization of the United Nations, Rome, 1969. pp. 30.

The work of the World Food Program from 1963 to mid-1969 is reviewed in this publication. The resources available to the Program, examples of the types of projects carried out, and a list of donors and their contributions are included.

Prices of Agricultural Products and Fertilizers in Europe, 1968-69, Joint Economic Commission for Europe and Food and Agriculture Organization of the United Nations, New York, 1970. pp. viii + 75 + appendix.

The aim of this report is to show the price changes in various agricultural products from year to year, and to provide some basic data on the relationship between prices paid and received by farmers in various countries. The period covered by this study is from 1965-66 to 1968-69.

Agricultural Development, A Review of FAO's Field Activities, Basic Study No. 23, Food and Agriculture Organization of the United Nations, Rome, 1970. pp. xii + 194.

This is a review of the development aid activities of the FAO, containing descriptions and assessments of the projects carried out by FAO up to 1969.

OTHER PUBLICATIONS

Not Available from the Economics Branch

1968 Beef Feeder Analysis, F. X. Kehoe, Economics Division, Alberta Department of Agriculture, Edmonton, 1970, Pub. No. 821.422, 3M.4.70. pp. ii + 15.

1968 Cow-Calf Enterprise Analysis, F. X. Kehoe, Economics Division, Alberta Department of Agriculture, Edmonton, 1970. Pub. No. 841.420.2, 3M.4.70. pp. ii + 16.

These publications contain summaries and analyses of the 50 beef feeder operations and the 84 cow-calf operations included in the 1968 Alberta Farm Management Study.

Canadian Journal of Agricultural Economics, Vol. 18, No. 1, February 1970. Published three times a year by the Canadian Agricultural Economics Society. Copies are available from the Society at: Suite 907, 151 Slater Street, Ottawa 4, Ontario. Single copies: \$3.50. Annual subscription: \$10.

Contents of the February 1970 issue include the following articles:

Disparités Régionales et Sclolarité en Agriculture
Preference Patterns in the World Grain Trade
Toward a Market-Oriented Canadian Grain Economy

World Agricultural Trade and Merchandising
Opportunities in the 1970's

The Cost of Handling and Storing Grain in
Manitoba Country Elevators

Conceptual and Empirical Issues in Estimating
Transfer Charges

A Framework for Developing Computerized Farm
Management Information

Taxation: A Neglected Aspect of Production
Economics

ERRATUM

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HON. H. A. OLSON, MINISTER — S. B. WILLIAMS, DEPUTY MINISTER

CANADIAN FARM ECONOMICS is published bi-monthly by the Economics Branch, Canada Department of Agriculture, Ottawa. Its purpose is to provide farmers, research and extension workers, government administrators and agri-business organizations with information on current economic developments in Canadian agriculture. Articles or other material appearing herein may be reproduced without permission provided credit is given to the source.

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CANADIAN FARM ECONOMICS

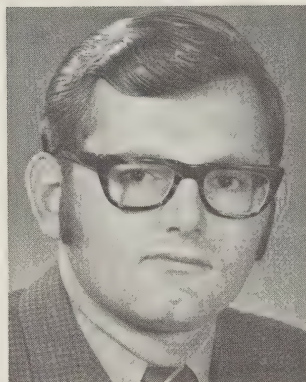
A NET IMPORTER IN 1969: CANADA'S AGRICULTURAL TRADE IN PERSPECTIVE

M. N. Gifford

It may be surprising to many people to know that in 1969, Canada became a net importer of agricultural products. This development appears even more startling when one compares the 1969 net import balance of \$35 million with the net export balance of \$826 million in 1966. What were the reasons for this rapid reversal? Will Canada regain its position as a net exporter of farm products? The following article suggests some of the answers to these and other questions by examining the factors underlying Canada's agricultural trade performance during the past decade.

AGRICULTURAL TRADE IN THE 1960'S

During the last half of the 1950's, Canadian agricultural exports averaged \$945 million, and imports were valued at \$747 million. By 1966, exports of farm products had reached a record high of \$1,862 million, compared with imports which had increased to \$1,036 million. At the end of the decade, however, Canada had become a net agricultural importer for the first time in modern history, when exports in 1969 (\$1,211 million) fell short of imports (\$1,246 million) by about \$35 million (Figure 1, Table 1). Although farm exports were still 28 per cent higher in 1969 than the average level of 1955-59,



total exports increased by 205 per cent during same period. As a result, agricultural exports represented only 8.4 per cent of total Canadian exports in 1969, compared with 20 per cent in 1955-59 (Tables 3 and 4). In comparison, agricultural imports as a percentage of total imports decreased from 12.9 per cent in 1955-59 to 8.8 per cent in 1969 because, although farm imports grew by 80 per cent during the decade, total imports rose by almost 166 per cent (Tables 5 and 6).

TABLE 1—CANADIAN AGRICULTURAL TRADE, AVERAGE 1955-59, ANNUAL 1960 TO 1969

Calendar Years	Exports	Imports	Net Trade Balance
	million dollars		
Average 1955-59	945	747	+198
1960	909	747	+162
1961	1,193	813	+380
1962	1,157	857	+300
1963	1,359	1,005	+354
1964	1,702	1,047	+675
1965	1,594	1,011	+583
1966	1,862	1,036	+826
1967	1,483	1,084	+399
1968	1,395	1,095	+300
1969	1,211	1,246	-35

Source: *Canada, Trade in Agricultural Products*, Pub. No. 70/12, Economics Branch, Canada Department of Agriculture, 1970.

Exports

The most striking development in Canada's agricultural exports during the entire postwar period was the post-1960 emergence of the U.S.S.R., China and other centrally-planned economies as major markets, especially for wheat. Agricultural exports to these countries rose from \$20 million in 1960 to more than \$619 million in 1966, and were primarily responsible for Canada's total farm exports increasing from \$909 million to a record \$1,862 million during the same period. Before the first large wheat shipments to Eastern Europe and China in 1961, more than 80 per cent of Canada's farm exports went to four markets—the United Kingdom, the European Economic Community, the United States and Japan. In comparison, by 1966, these areas only took about 52 per cent while sales to

centrally-planned economies accounted for a third of Canada's farm exports (Figure 2, Table 2).

Wheat accounted for most of the variability in total agricultural exports (Table 3). Wheat and flour exports rose from a 1955-59 average of \$490 million (51 per cent of all exports) to a record high of \$1,142 million in 1966 (61 per cent of all exports).

Since 1966, total exports have declined each year, reaching \$1,211 million in 1969. More than 95 per cent of this decrease can be attributed to the \$619 million reduction in wheat and flour sales. Although wheat and flour exports to our traditional markets in the U.K., EEC and Japan declined significantly (from \$381 million to \$267 million), it was the mas-

CANADA'S AGRICULTURAL TRADE, 1955-59 to 1969

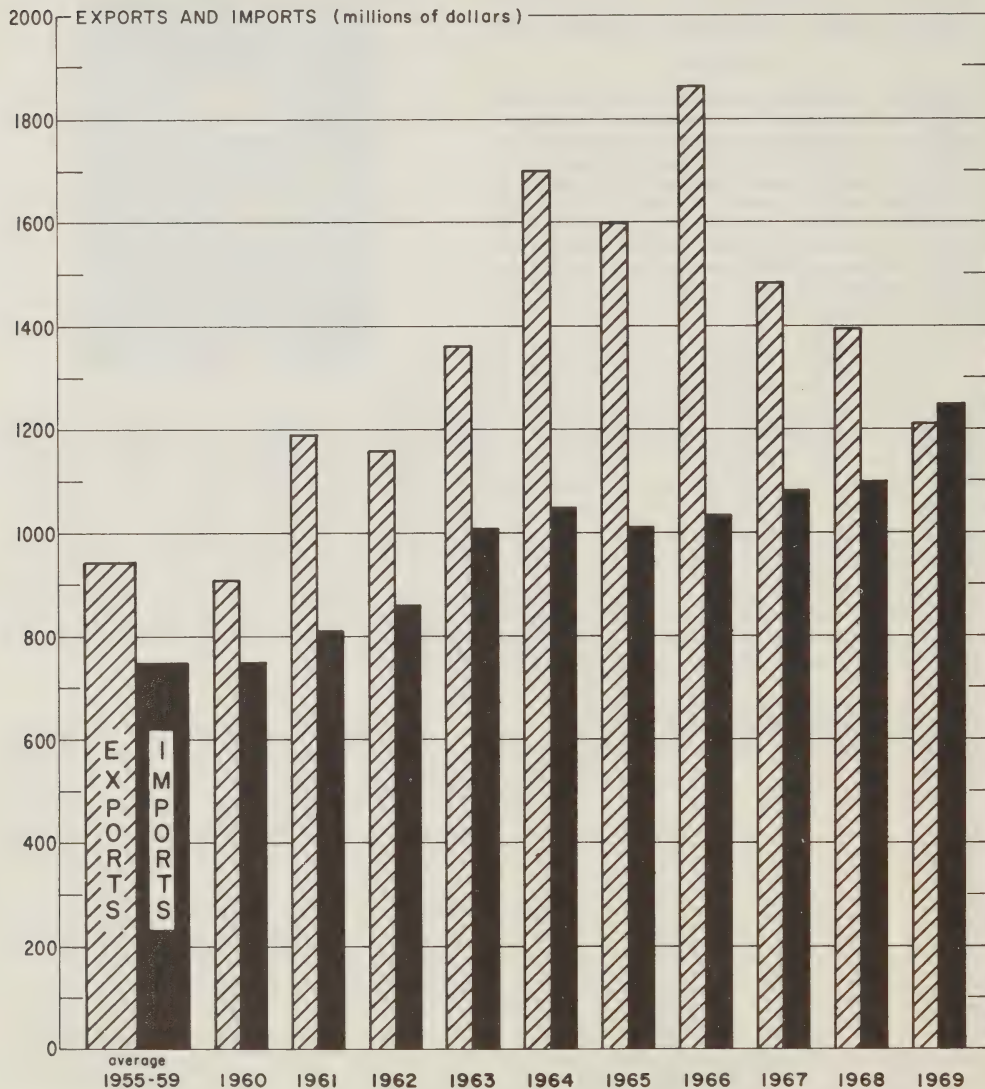


FIGURE 1

TABLE 2—CANADIAN AGRICULTURAL EXPORTS TO SELECTED AREAS, 1960 TO 1969

Area	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
	thousand dollars									
U.K.										
Total agricultural exports.....	289,100	272,862	295,328	320,603	331,878	332,383	308,411	294,413	269,678	252,287
Wheat and wheat flour ^a	158,087	162,264	162,915	183,125	169,120	159,865	149,222	129,557	111,816	92,506
U.S.										
Total agricultural exports.....	193,269	224,829	223,926	223,319	211,472	273,770	279,627	243,948	278,412	293,130
Wheat and wheat flour ^a	15,565	16,980	14,892	16,308	9,170	3,228	3,857	1,708	1,790	2,402
EEC										
Total agricultural exports.....	149,455	213,266	184,249	181,117	180,278	216,135	221,093	205,939	155,680	150,496
Wheat and wheat flour ^a	109,019	178,977	130,243	134,033	110,022	125,559	118,571	118,679	106,597	97,835
Japan										
Total agricultural exports.....	105,849	118,742	113,112	132,890	139,102	143,242	172,502	184,195	167,488	147,502
Wheat and wheat flour ^a	84,853	94,817	88,753	96,364	105,287	141,202	112,940	123,923	95,100	76,244
Centrally-Planned Economies ^b										
Total agricultural exports.....	19,767	59,809	36,276	42,987	182,292	142,703	116,441	78,596	80,295	45,325
Wheat and wheat flour ^a	8,216	48,052	28,435	35,111	165,334	120,265	99,862	67,280	67,709	33,815
U.S.S.R.										
Total agricultural exports.....	500	13,182	924	148,465	312,962	190,227	319,498	124,288	84,633	3,694
Wheat and wheat flour ^a	—	13,001	—	147,617	311,570	189,087	316,491	119,542	83,099	2,399
China										
Total agricultural exports.....	—	120,201	147,159	104,411	136,162	104,625	182,820	89,194	157,753	119,777
Wheat and wheat flour ^a	—	91,803	134,254	103,000	116,725	104,625	182,819	89,191	157,746	119,776
Other Areas										
Total agricultural exports.....	151,057	170,088	156,408	205,169	207,871	190,566	261,402	262,716	202,481	198,977
Wheat and wheat flour ^a	96,592	116,967	99,127	133,862	136,584	62,649	160,068	152,658	118,552	100,212
All Areas										
Total agricultural exports.....	908,997	1,192,979	1,157,382	1,358,961	1,702,017	1,593,651	1,861,794	1,483,289	1,395,420	1,211,188
Wheat and wheat flour ^a	472,332	722,861	658,619	849,420	1,123,812	906,480	1,143,860	802,538	742,409	525,189

— = nil.

^a Including seed wheat.^b Excluding U.S.S.R. and China, but including East Germany, Poland, Roumania, Bulgaria, Czechoslovakia, Hungary and Cuba.Source: *Trade of Canada*, Cat. No. 65-201, Dominion Bureau of Statistics.

TABLE 3—CANADIAN EXPORTS: TOTAL, TOTAL AGRICULTURAL, WHEAT AND WHEAT FLOUR, AND OTHER SELECTED AGRICULTURAL ITEMS, AVERAGE 1955-59, ANNUAL 1960 TO 1969

Item	Unit	Average 1955-59	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Total exports.....	thousand dollars	4,734,662	5,255,575	5,754,985	6,178,523	6,798,538	8,094,360	8,525,078	10,070,627	11,111,580	13,250,960	14,441,556
Change from 1955-59.....	per cent		+11.0	+21.6	+30.5	+43.6	+71.0	+80.0	+112.7	+134.7	+179.9	+205.0
Agricultural exports.....	thousand dollars	994,574	908,997	1,192,979	1,157,382	1,358,961	1,702,017	1,593,651	1,861,794	1,483,289	1,395,470	1,211,188
Change from 1955-59.....	per cent		-3.8	+26.3	+22.5	+43.9	+80.2	+68.7	+97.1	+57.0	+47.7	+28.2
Percentage of total exports	per cent	20.0	17.3	20.7	18.7	20.0	21.0	18.7	18.5	13.3	10.5	8.4
Wheat and wheat flour ^a	thousand dollars	492,217	472,332	722,861	658,619	849,420	1,123,812	906,480	1,143,860	802,538	742,409	525,189
Change from 1955-59.....	per cent		-4.0	+46.8	+33.8	+72.6	+128.3	+84.2	+132.4	+63.0	+50.8	+6.7
Percentage of agricultural exports.....	per cent	51.9	51.4	59.7	56.3	61.9	65.7	56.7	61.3	54.0	53.1	43.3
Agricultural exports excluding wheat and wheat flour.....	thousand dollars	452,357	436,665	470,118	498,763	509,541	578,205	687,171	717,934	680,751	653,061	685,999
Change from 1955-59.....	per cent		-3.5	+3.9	+10.2	+12.6	+27.8	+51.9	+58.7	+50.5	+44.4	+51.6
Percentage of agricultural exports.....	per cent	48.1	48.6	40.3	43.7	38.1	34.3	43.3	38.7	46.0	46.9	56.7
Oilseeds and products.....	thousand dollars	80,566	85,829	89,263	99,241	93,762	96,915	132,902	145,977	126,984	107,484	115,305
Change from 1955-59.....	per cent		+6.5	+10.8	+23.2	+76.4	+20.3	+65.0	+81.2	+57.6	+33.4	+43.1
Meats.....	thousand dollars	42,843	44,297	42,789	42,245	44,160	51,456	75,602	71,181	58,086	69,317	76,382
Change from 1955-59.....	per cent		+3.4	-1	-1.4	+3.1	+20.1	+76.5	+66.1	+35.6	+61.8	+78.3
Dairy products.....	thousand dollars	18,074	26,341	24,062	24,534	27,914	61,040	46,437	36,239	33,799	31,976	36,478
Change from 1955-59.....	per cent		+45.7	+33.1	+35.7	+54.4	+237.8	+156.9	+100.5	+87.0	+76.9	+101.8
Tobacco, raw.....	thousand dollars	21,893	25,327	27,617	34,624	29,107	37,824	34,596	37,938	47,034	54,200	58,875
Change from 1955-59.....	per cent		+15.7	+26.1	+58.2	+33.0	+72.8	+58.0	+73.3	+114.8	+147.6	+188.9
Fruits and nuts.....	thousand dollars	11,889	13,643	13,474	17,938	23,051	21,943	20,480	23,648	29,891	29,875	25,812
Change from 1955-59.....	per cent		+14.8	+13.3	+50.9	+93.9	+84.6	+72.3	+98.9	+151.4	+151.3	+117.1
Vegetables ^b	thousand dollars	14,260	16,969	17,086	25,207	29,126	33,854	43,839	41,630	49,772	46,454	51,790
Change from 1955-59.....	per cent		+19.0	+19.8	+76.8	+104.2	+137.4	+207.4	+191.9	+249.0	+225.8	+263.2
Live animals.....	thousand dollars	47,304	39,804	65,516	66,630	39,637	31,806	75,872	72,985	35,780	51,947	47,131
Change from 1955-59.....	per cent		-15.9	+38.5	+40.8	-16.2	-32.8	+60.4	+54.3	-24.4	+9.8	-4
Coarse grains (barley, oats, rye).....	thousand dollars	96,142	61,229	57,730	44,919	52,731	71,494	67,443	69,788	88,498	50,976	37,143
Change from 1955-59.....	per cent		-36.3	-40.0	-53.3	-45.2	-25.6	-30.0	-27.4	-8.0	-47.0	-61.4

^a Including seed wheat.

^b Including potatoes.

^c Including seed oats.

Source: *Trade of Canada*, Cat. No. 65-201, Dominion Bureau of Statistics.

CANADIAN AGRICULTURAL EXPORTS BY DESTINATION - 1960, 1966 AND 1969

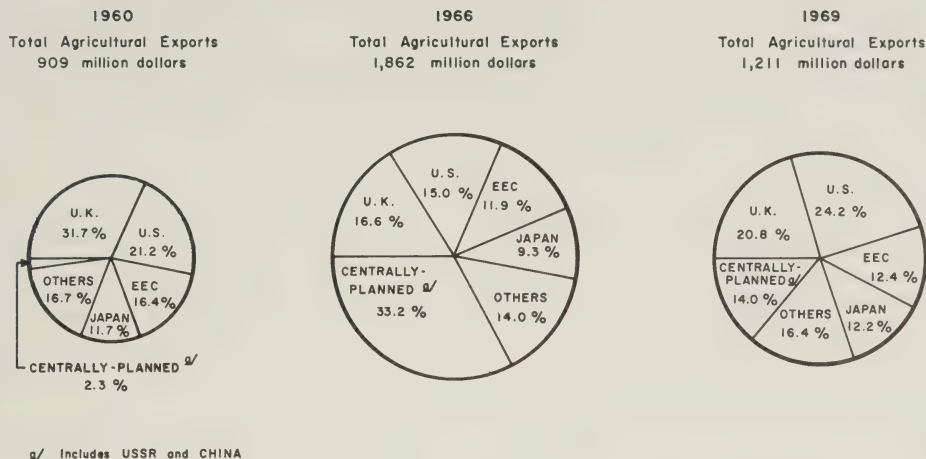


FIGURE 2

TABLE 4—TOTAL EXPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS TO ALL COUNTRIES BY MAJOR COMMODITY GROUPINGS, AVERAGE 1955-59 AND 1960-64, ANNUAL 1965 TO 1969

Commodity	Average 1955-59	Average 1960-64	1965	1966	1967	1968	1969
million dollars							
All commodities	4,760.4	6,410.6	8,525.1	10,070.6	11,111.6	13,251.0	14,441.6
Agricultural products	944.6	1,264.1	1,593.6	1,861.8	1,483.3	1,395.4	1,211.2
Grains	521.8	746.9	906.4	1,130.6	830.6	736.3	510.2
Grain products	82.2	86.2	83.3	102.7	84.1	82.4	81.7
Animal feeds ^a	15.9	22.0	33.9	34.9	36.4	31.7	39.2
Oilseeds	59.3	68.8	98.1	117.9	101.9	83.6	94.3
Oilseed products	21.3	24.2	34.8	28.0	24.9	23.9	21.0
Animals, living	47.3	48.7	75.9	73.0	35.6	51.9	47.1
Meats	42.8	45.0	75.6	71.2	58.1	69.3	76.4
Other animal products	52.2	63.0	83.0	97.3	87.3	87.4	93.7
Dairy products	18.1	32.8	46.4	36.2	33.8	32.0	36.5
Poultry and eggs	4.7	3.2	3.3	5.1	5.8	5.6	6.7
Fruits and nuts	11.9	18.0	20.5	23.6	29.9	29.9	25.8
Vegetables ^b	7.1	16.2	26.2	28.9	35.4	32.5	36.7
Potatoes	7.1	8.3	17.6	12.7	14.4	14.0	15.1
Seeds for sowing	12.3	20.2	17.9	14.9	12.2	12.2	14.6
Maple products	4.9	5.6	5.6	6.6	7.0	6.4	7.2
Tobacco, raw	21.9	30.9	34.6	37.9	47.0	54.2	58.9
Other agricultural products ^c	13.8	24.1	30.5	40.3	38.9	42.1	46.1

^a Excluding oilcake and meal (included in Oilseed products).

^b Excluding potatoes.

^c Including items such as nursery and florist stock, confectionery, peat moss, etc.

Source: *Canada, Trade in Agricultural Products*, Pub. No. 70/12, Economics Branch, Canada Department of Agriculture, various issues.

sive reduction in shipments to the centrally-planned economies that accounted for the bulk of the decrease (from \$599 million in 1966 to \$156 million in 1969). Exports to the USSR alone decreased from \$316 million in 1966 to only \$2 million in 1969.

In comparison with wheat and flour exports (which were still 7 per cent higher in 1969 than the 1955-59 annual average), exports of all other products increased significantly, in the aggregate, during the past decade, from \$454 million to \$686 million, or 51 per cent. The only two main non-wheat commodity sectors which did not experience absolute increases were coarse grains (barley, oats and rye) and live animals (mainly feeder cattle exports to the U.S.). Exports of coarse grains reached the lowest level of the decade in 1969 (\$37 million) compared with an annual average of \$96 million between 1955-59 and \$88 million as recently as 1967. The disappointing comparison between 1967 and 1969 can largely be attributed to drastically reduced sales of barley to our major market, Japan. This loss was primarily caused by heavily subsidized competition from the EEC. (In some months of 1969, the amount of the EEC export subsidy was more than the Canadian f.o.b. selling price). Exports of live cattle fluctuated characteristically throughout the 1960's, reflecting the North American supply and demand situation.

Throughout the past decade, the vegetable, tobacco, fruits, meats and oilseed sectors have all experienced an upward trend in exports. Vigorous economic growth in the United States has been the main factor responsible for sharply increased exports of vegetables, meats and fruits to that market. Exports of vegetables were also stimulated by the strong demand for processed and frozen vegetable products in the U.K. Exports of oilseeds and oilseed products rose continuously from 1960 to 1966 but since that time have fallen off (from a record high of \$146 million in 1966 to \$115 million in 1969) as a result of reduced sales to the EEC and the U.K. Increased exports of rapeseed were offset by declining sales of flaxseed and soybeans. Tobacco exports increased from an annual average of \$22 million during 1955-59 to a record high of \$59 million in 1969. The increase in tobacco exports has been due primarily to the U.K. embargo on Rhodesian supplies reinforced by the U.K. preferential tariff for Canadian tobacco. The U.K. currently accounts for more than 90 per cent of Canada's tobacco exports. Dairy exports have fluctuated according to the domestic surplus situation. The record high of \$61 million in 1964 was abnormal in that it was inflated by the Canadian butter surplus disposal program of that year. The main Canadian dairy

exports (primarily skim milk powder and cheddar cheese) have to be subsidized in order to compete on the distressed international market.

Looking at exports by destination, it is significant to note that, in 1969, exports to the U.S. reached their highest level of the decade in absolute terms, although the U.S. accounted for exactly the same proportion of Canadian non-wheat and flour exports in 1969 as it did in 1960, that is, 43 per cent. Exports to all other major market areas were down in 1969 from the preceding year and, in the case of the U.K., exports were at the lowest level of the entire postwar period (Table 2).

The main reason for Canada's lackluster (relative to 1966) agricultural export performance in 1969 was the sharply reduced demand for wheat from the centrally-planned countries. But the apparent simplicity of this explanation tends to obscure the fact that Canadian farm exports to traditional markets have grown very slowly or not at all during the past ten years (Table 2). Agricultural exports to our major markets in the developed countries (that is, the U.S., U.K., EEC and Japan) were only 12 per cent higher in 1969 than the average level of 1955-59. What were the reasons for this stagnation?

The largest influence can be attributed to one basic cause—extensive government intervention in the agricultural sectors of the developed countries. This intervention has resulted in agricultural trade in temperate products being increasingly distorted by import barriers and export subsidies. In many cases, the desire of governments to bolster domestic agricultural incomes has resulted in the encouragement of uneconomic production through excessive price supports. Such expanded production has invariably led to a proliferation of border restrictions to protect the domestic market, and/or export subsidies to remove the resulting surpluses. The evolution of the Common Agricultural Policy (CAP) of the EEC provides a classic example of such policies. EEC self-sufficiency has increased as a result of high, domestic support prices insulated at the border by an import system based primarily on variable levies. These policies affect Canadian exports in two ways. Firstly, expanded domestic production within the EEC reduces the demand for imports. Secondly, EEC surpluses are moved into world markets by means of export subsidies, financed largely by the levies and tariffs collected on imports. Thus, for example, Canadian wheat and barley exports to the EEC have declined because of increased self-sufficiency and, at the same time, our trade with third country markets has been disrupted by heavily subsidized EEC exports (*1*).

TABLE 5—CANADIAN IMPORTS: TOTAL, TOTAL AGRICULTURAL, SELECTED AGRICULTURAL ITEMS, AVERAGE 1955-59, ANNUAL 1960 TO 1969

Item	Unit	Average 1955-59	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Total imports.....	thousand dollars	5,349,440	5,482,685	5,768,578	6,257,776	6,558,209	7,487,707	8,633,148	9,886,439	11,075,199	12,357,982	14,201,627
Change from 1955-59.....	per cent		+2.5	+7.8	+17.0	+22.6	+40.0	+61.4	+84.8	+107.0	+131.0	+185.5
Agricultural imports.....	thousand dollars	691,976	746,803	813,310	856,802	1,004,800	1,047,373	1,011,415	1,035,618	1,083,570	1,095,472	1,245,760
Change from 1955-59.....	per cent		+7.9	+17.5	+23.8	+45.1	+51.4	+46.2	+49.7	+56.6	+58.3	+80.0
Percentage of total imports	per cent	12.9	13.6	14.1	13.7	15.3	14.0	11.7	10.5	9.8	8.9	8.8
Fruits and nuts.....	thousand dollars	154,225	174,457	183,492	184,752	198,184	208,626	213,378	215,929	227,077	250,046	271,252
Change from 1955-59.....	per cent		+13.1	+19.0	+19.8	+28.5	+35.3	+38.4	+40.0	+47.2	+62.1	+75.9
Vegetables ^a	thousand dollars	52,317	55,289	58,722	65,778	66,867	73,293	82,488	91,518	100,283	106,130	114,381
Change from 1955-59.....	per cent		+5.7	+12.2	+25.7	+27.8	+40.1	+57.7	+74.9	+91.7	+102.8	+118.6
Meats.....	thousand dollars	18,973	29,558	41,674	41,631	59,560	43,084	39,579	56,129	59,991	65,686	121,046
Change from 1955-59.....	per cent		+55.8	+119.6	+119.4	+213.9	+127.1	+108.6	+195.8	+216.2	+246.2	+538.0
Other animal products.....	thousand dollars	47,702	46,522	73,756	79,220	90,584	96,242	94,603	98,658	82,828	83,170	92,518
Change from 1955-59.....	per cent		-2.5	+54.6	+66.1	+90.0	+101.8	+98.3	+106.8	+73.6	+74.4	+93.4
Oilseeds and products.....	thousand dollars	69,095	78,793	87,600	101,438	105,246	114,617	121,862	129,228	121,844	107,052	128,309
Change from 1955-59.....	per cent		+14.0	+26.8	+46.8	+52.3	+65.9	+76.4	+87.0	+76.3	+54.9	+85.7
Sugar.....	thousand dollars	60,333	50,717	55,676	57,139	128,493	104,821	56,341	46,712	49,816	48,841	72,709
Change from 1955-59.....	per cent		-15.9	-7.7	-5.3	+113.0	+73.7	-6.6	-22.6	-17.4	-19.0	+20.5
Plantation crops.....	thousand dollars	132,345	125,866	118,177	125,471	130,831	151,921	146,055	139,745	144,387	153,318	155,677
Change from 1955-59.....	per cent		-4.9	-10.7	-5.2	-1.2	+14.8	+10.4	+5.6	+9.1	+15.8	+17.6

^a Excluding potatoes.Source: *Trade of Canada*, Cat. No. 65-201, various issues, Dominion Bureau of Statistics.

Although the magnitude of the social, economic and political problems surrounding agricultural adjustment in developed market economies cannot be underestimated, it nevertheless remains a fact that, to date, the principal efforts of governments to alleviate their respective farm income problems have been essentially limited to price support measures which have inevitably distorted normal trading relationships through the generation of surpluses, import restrictions and export subsidies. The growing adverse impact of the policies of most of Canada's traditional trading partners and competitors was effectively obscured during the "golden export years" of the mid-1960's when Canadian wheat exports to the centrally-planned economies reached record levels. It was only during the post-1966 decline of such sales that the cumulative effects of the CAP and similar policies (such as the U.K. policy of increasing agricultural self-sufficiency to improve the balance of payments) became evident. The near collapse of the international wheat market in 1969 was the most striking symptom.

It must be noted, however, that apart from the downward pressures exerted on Canadian exports by extensive government intervention (as exemplified by import restrictions and export subsidies), there were also other adverse effects stemming from "normal" competition. In the case of wheat exports, for example, these included the adoption of protein grading by the main competitors, advances in milling technology which reduced the proportion of hard wheats required for bread making, and improved customer service and market promotion by competing exporters. Competition for the limited "commercial" wheat import requirements of the developed countries was further accentuated by the decline in the amount of wheat required for food aid in the developing countries.

Thus, during the latter half of the 1960's, the combination of the decline in the demand for wheat by the centrally-planned countries and the increasingly severe pressures generated by the support policies of other countries, together with various technical factors involved in wheat marketing, were the major adverse demand factors determining Canada's export level at the end of the decade (2).

Imports

The level and composition of imports are primarily functions of domestic income and population growth. In view of the strong performance of the Canadian economy during the past ten years, it is not surprising that the chief characteristic of Canada's agricultural imports has been sustained growth. Imports increased from an annual average of \$692 million in the 1955-59

period to \$1,246 million in 1969, an increase of 80 per cent. To put the growth of agricultural imports in perspective, however, it should be noted that *total* imports increased by 166 per cent during the same period (Table 5). This was to be expected since, in the aggregate, the demand for agricultural products grows at a slower rate than that for non-farm products.

As incomes rise, the demand for meats (and hence, animal feeds), fruits and most vegetables grows faster than the demand for wheat and many dairy products. Thus, the growth in imports was not limited to products of a kind not produced in Canada, that is, tropical commodities. In fact, imports of plantation crops, such as rubber, tea, coffee and cocoa, were only 18 per cent higher in 1969 than the 1955-59 average. In comparison, imports of red meats were up an astounding 538 per cent. Vegetable imports were up 119 per cent and fruits, 76 per cent. Oilseed imports (including tropical oilseeds, but largely comprised of soybeans and soybean products) rose by almost 86 per cent during the decade.

Canada's agricultural import trade has been relatively free of the extreme annual fluctuations which occur so frequently in the level of exports. During the past ten years, imports increased by an annual average of \$55 million. During the 1960-69 period, there were only two occasions when agricultural imports increased by more than \$100 million in any single year. The first time was in 1963: the second was in 1969. The major contributing factor to the sudden surge of imports in 1963 was the world sugar shortage of that year. Abnormally high world prices resulted in the value of Canadian sugar imports increasing from \$57 million in 1962 to \$128 million in 1963. What were the reasons for the 1969 import surge which saw total farm imports increase from \$1,095 million to \$1,246 million? Tables 5 and 6 clearly indicate the answers. Although all main agricultural imports increased, one category was of special significance—red meats. Imports of red meats almost doubled in value from \$66 million in 1968 to \$121 million in 1969. Throughout the 1960's, the source of Canada's farm imports did not change significantly—the U.S. consistently supplied slightly more than half of our requirements. However, in 1969, a striking development occurred when meat imports from New Zealand and Australia increased from \$28 million in 1968 to more than \$62 million. These Oceanic meat imports were mostly beef and mutton destined for the processed meat trade. The strong domestic demand for all meats was also reflected in the increase in meat imports from the U.S. which increased from \$28 million to \$44 million, mainly as a result of the increase in pork shipments. In addition, as in

TABLE 6—TOTAL IMPORTS AND IMPORTS OF AGRICULTURAL PRODUCTS FROM ALL COUNTRIES BY MAJOR GROUPINGS, AVERAGE 1955-59 AND 1960-64, ANNUAL 1965 TO 1969

	Average 1955-59	Average 1960-64	1965	1966	1967	1968	1969
	million dollars						
All commodities.....	5,378.5	6,311.5	8,633.1	9,866.0	11,075.2	12,358.0	14,201.6
Agricultural products.....	692.0	893.8	1,011.4	1,035.6	1,083.6	1,095.5	1,245.8
Grains.....	18.5	38.3	37.5	41.3	52.6	51.6	49.4
Grain products.....	9.5	12.6	17.8	18.6	21.9	21.6	22.4
Animal feeds ^a	1.9	3.2	5.3	5.2	5.1	6.7	9.4
Oilseeds.....	23.8	40.9	60.8	65.4	61.8	44.0	59.2
Oilseed products.....	37.8	49.3	61.1	63.8	60.1	69.1	69.1
Animals, living.....	5.4	6.2	5.6	7.6	15.4	9.1	12.2
Meats.....	19.0	43.1	39.6	56.1	60.0	65.7	121.0
Other animal products.....	47.7	77.3	94.6	98.6	82.8	83.2	92.5
Dairy products.....	5.6	8.5	12.9	19.1	18.9	17.8	20.4
Poultry and eggs.....	8.4	10.8	10.8	15.7	17.1	16.2	17.3
Fruits and nuts.....	161.7	197.3	213.4	215.9	277.1	250.0	271.2
Vegetables ^b	53.6	64.9	82.5	91.5	100.3	106.1	114.4
Potatoes.....	8.2	8.0	3.3	8.6	6.7	10.6	8.6
Seeds for sowing.....	8.5	7.6	8.7	8.7	7.8	8.4	7.5
Sugar.....	60.3	79.4	56.4	46.7	49.8	48.8	72.7
Tobacco, raw.....	3.2	4.4	6.1	4.5	6.6	4.8	5.0
Vegetable fibres ^c	52.2	60.4	77.2	58.3	72.5	61.0	57.7
Plantation crops ^d	132.3	130.4	146.0	139.7	144.4	153.3	155.7
Other agricultural products ^e	34.4	51.2	71.8	70.3	72.7	67.5	80.1

^a Excluding oilcake and meal (included in Oilseed products).

^b Excluding potatoes.

^c Mainly cotton.

^d Mainly coffee and tea products, natural rubber, cocoa beans.

^e Including items such as florist and nursery stock, confectionery, spices, food flavourings.

Source: *Canada, Trade in Agricultural Products*, Pub. No. 70/12, Economics Branch, Canada Department of Agriculture, various issues.

1963, higher world prices in 1969 were responsible for a large value increase in Canadian sugar imports, which rose by more than \$33 million from 1968.

Trade Performance in 1969

The essential facts determining the 1969 agricultural trade performance are thus clear. Exports were down significantly, mainly because of drastically reduced wheat shipments to the centrally-planned countries and to a lesser extent, to our traditional wheat markets in the developed market economies. On the other hand, the value of imports jumped sharply, primarily as a result of the strong domestic demand and domestic supply imbalance for red meats and higher world sugar prices.

IMPLICATIONS FOR THE FUTURE

Will Canada be a net agricultural importer in 1970 and 1971? The answer is a tentative "no", but for the longer run, the outlook is less clear. The reasons for the expected net export balance in the next two years can be mainly attributed to increased barley, wheat and rapeseed sales. Barley sales for export during the 1970-71 crop year are already at a level which assures that they will exceed the previous record of 122 million bushels in 1952-53. Wheat exports will be up significantly from the 1969 nine-year low, reflecting, in part, the U.S.S.R. agreement to take the balance of a previously negotiated sales contract and

also the success of the federal program of guaranteeing and subsidizing credit sales. (Under this program, substantial sales have been made to Syria, Peru, the United Arab Republic and Brazil.) Rapeseed exports should reach record levels during the next two years on the basis of expected available supplies. On the import side, increased domestic hog production will reduce pork imports and increase exports in our two-way trade with the U.S. However, in view of the time lags involved in increasing domestic beef supplies, it is anticipated that beef and mutton imports for processing will continue at or near the record level of 1969. It is also likely that the availability of meat supplies from the Oceanic countries will permit somewhat higher Canadian meat exports to the U.S. (Australia and New Zealand adhere to voluntary export restraints with regard to meat trade with the U.S.)

It must be noted, however, that the higher the absolute level of the 1970 and 1971 trade surplus, the greater will be the contribution of a combination of fortuitous short-term factors which are rapidly developing in 1970, such as, the blight-induced reduction in the U.S. corn crop and weather-induced reductions in grain production in Europe and Australia. These short-term influences must be recognized and placed in perspective to avoid possible misconstructions of the long-term outlook.

Looking beyond 1971, it appears likely that Canadian exports will be under heavy pressure to

match the steady growth in imports which domestic income and population pressures will generate. This conclusion follows in part from the fact that, except for the U.S. market, the level of Canadian exports is overwhelmingly determined by wheat sales. In view of the relatively stagnant commercial demand for wheat, it will be difficult for Canada to sustain an annual average export level of from 350 to 375 million bushels (including flour equivalent) in the next decade, (compared with 570 million bushels in 1966 and 269 million bushels in 1969) (3).

Complicating the projection of future export levels is the likelihood of Britain's acceding to the EEC. The adoption of the highly protectionist Common Agricultural Policy by the U.K. could result in a significant reduction of Canadian farm exports to a market which is already declining as a result of present British policies. A significant reduction in exports to Britain will be difficult to offset in view of the extreme importance of the British market for many Canadian farm exports (4). The U.K. is Canada's second largest export market and, apart from the largest—the U.S., is the most diversified. In 1969, Britain took more than 80 per cent of the exports of the following commodities: tobacco (\$54 million), soybean oilcake and meal (\$14 million), cheddar cheese (\$9 million), dried vegetables (\$6 million), dried beans (\$4 million), soybean oil (\$3 million), and canned corn, (\$2 million). Moreover, in 1969, the British market accounted for more than 20 per cent of Canada's total agricultural exports, including 19 per cent of wheat (\$88 million) and 46 per cent of barley exports (\$38 million). In general, it can be expected that the adverse trade effects of the agricultural policies of Western Europe will continue to exert downward pressures on Canadian exports to this area, and indirectly, to third country markets.

What avenues are open to mitigate the growing distortions in agricultural trade? At the government level, Canada has to continue to press, in both bilateral and multilateral forums, against the proliferation of import restrictions and export subsidies. However, although extremely important, efforts to expand access to world markets through such means as multilateral trade negotiations and international commodity agreements are essentially "defensive", in that they only influence the *potential* scope for exports. In the long run, expanding traditional export markets and opening up new markets will continue to require "offensive" measures such as competitive pricing, guarantees of supply continuity and extensive market promotion and development. Potential exports will not be translated into actual sales unless Canadian agriculture is prepared to react to the dynamics of international trade. If some

markets are lost—and they will be, since Canadian "shares" are not regarded as an inherent right by competitors—new markets will have to be developed. If the demand for one product stagnates, resources will have to be transferred to products with strong growth potential. The implication for all levels of governments, and for the agricultural sector in general, is that more resources must be concentrated on market research and development and on market information dissemination.

One of the few bright spots in agricultural trade is the growing world demand for meats and hence for animal feeds. Whether Canadian exports of livestock, meat, barley and rapeseed will expand to take advantage of the opportunities will depend upon domestic production and marketing adjustments, particularly in Western Canada. It is not overstating the case to conclude that the adjustments made by the western grain-livestock sector will largely determine whether Canada will continue as a net exporter beyond 1971. Except for Western Canada, exports are primarily a residual market for the agricultural sector. Annual increases in export levels of tens of millions of dollars are not going to be achieved by such products as cheese. This is not to say that product diversification in exports is undesirable or that exports are not important to the specific regions outside of the Prairie Provinces. This is obviously untrue. However, it should be realized that only a few commodities have the potential to significantly affect the future level of agricultural exports.

There is nothing inherently wrong with a country's being a net importer of agricultural products. In fact, on the basis of an efficient allocation of the available domestic resources, many countries should accept this situation as an economic reality. But is Canada one these countries?

NOTES AND REFERENCES

- (1) The assistance of Dr. G. J. Dobson, Economics Branch, and Mr. J. S. Lohar, International Liaison Service, Canada Department of Agriculture, in the preparation of this article is gratefully acknowledged.
- (2) Lohar, J. S., and M. N. Gifford, "The Common Agricultural Policy of the EEC and its Implications for Canada", *Canadian Farm Economics*, Vol. 4, No. 5, December 1969.
- (3) For an explicit examination of the growing importance of the domestic market and the implications for export availability, see Purnell, G. R., "Short and Long-Term Significance of World Trends and Domestic Prospects for Canadian Agriculture", *Proceedings of the Canadian Agricultural Outlook Conference*, 1969, Vol. 2., November 1969.
- (4) Hudson, S. C., *Future Market Outlets for Canadian Wheat and Other Grains*, Economic Council of Canada, Special Study No. 11, January 1970. Hudson projects total wheat and flour exports of about 360 million bushels in 1975.
- (5) Gifford, M. N., "The United Kingdom Market for Canada's Agricultural Exports", *Canadian Farm Economics*, Vol. 2, No. 5, December 1967.



BASIC PARAMETERS OF THE PRIMARY DAIRY INDUSTRY IN ONTARIO AND QUEBEC

I. F. Furniss

The overall importance of dairy farming in the agricultural economies of Ontario and Quebec is such that any broad government policies and programs aimed at encouraging agricultural adjustment to changing markets and technology must of necessity have particular relevance for dairy farmers. This article is an in depth analysis of resource use and structure of dairy farming in the two provinces, based primarily on census data but also employing data from other sources as indicators of recent trends. The study supports the conclusion that the primary dairy industry is largely one of small-size enterprise, but that there is considerable variation both within regions and between regions of each province. The implication is drawn that many of the characteristics (parameters) described are such that government policies and programs, rather than strictly economic factors, will be the deciding forces in shaping the future structure and size of the dairy industry, particularly in the disadvantaged regions.

INTRODUCTION

The objective of this paper is to present an analysis of the size structure of the primary dairy industry in Ontario and Quebec based largely upon data from the 1966 Census of Agriculture for census-farms classified as dairy-type (1). This analysis was undertaken to derive basic parameters (2) for the dairy farming sector, classified by herd size (3) and by region. Unless otherwise specified, all data presented in this paper were derived from this source. The analysis also employs data from other sources as indicators of possible changes in structure since 1966.

Dairy farming is, in many ways, the most important agricultural pursuit in Ontario and Quebec. It accounts for more than a fifth of total farm cash receipts in the former province and more than 40 per cent in the latter (4). The 1966 Census of Agriculture classified 26,609 census-farms as "dairy-type" in Quebec and 21,159 in Ontario. These two provinces together accounted for 85 per cent of all dairy census-farms in Canada (5). Dairy census-farms represented about 63 per cent of all product-typed census-farms in Quebec and 30 per cent in Ontario in the same year.

In addition to those census-farms classified as dairy-type, a large number of other census-farms keep cows and heifers for milking. Thus, in 1966, 62,020 census-farms in Quebec reported one or more cows and heifers kept for milking (6) compared with 51,865 census-farms in Ontario. The two provinces accounted, in 1966, for more than 71 per cent of all milk cows and heifers, or 1,904,000 out of a total

number in Canada of 2,677,000 cows and heifers. Those milk cows and heifers on dairy census-farms comprised about 65 per cent of all milk cows and heifers on product-typed census-farms, or 1,438,000 out of a total of 2,219,000 cows and heifers. They also comprised 54 per cent of all milk cows and heifers on all census-farms, or 1,438,000 out of the total of 2,677,000 cows and heifers (7). Thus, there are almost as many milk cows and heifers on census-farms not classified as dairy census-farms as there are on those census-farms so classified. In this paper, however, the analysis will be concerned only with those census-farms classified as "dairy-type". It is this group of census-farms, dependent primarily on dairying, that probably are most affected by changes in markets for dairy products and in dairy-farming technology.

RESULTS AND DISCUSSION

Since both Ontario and Quebec are large geographic regions, and since dairying is found throughout both provinces, the data were grouped by economic subregions within each province to provide some understanding of the spatial or geographical differences which exist. In Ontario, the regions chosen correspond to the designated "agricultural districts" (8) while, in Quebec, they correspond generally to the designated "agricultural regions" (9). In the accompanying tables, the study regions have been numbered to simplify the tabular presentation but in the discussion, each region will be referred to by name. Figures 1 and 2 indicate the

AGRICULTURAL REGIONS OF ONTARIO

The map illustrates the five agricultural regions of Ontario, each defined by a number and a thick black border. Region 1 (Southern) includes counties 1-5. Region 2 (Western) includes counties 6-10. Region 3 (Central) includes counties 11-15. Region 4 (Eastern) includes counties 16-20. Region 5 (Northern) includes counties 21-25. The map also shows the Great Lakes (Lake Huron, Lake Erie, Lake Ontario) and major water bodies like Georgian Bay and James Bay. County names are labeled throughout the province.

1 - Prescott
2 - Russell
3 - Osgooshy
4 - Stormont
5 - Dundas
6 - Granville
7 - Frontenac
8 - Lennox & Addington
9 - Hastings
10 - Prince Edward
11 - Peterborough
12 - Victoria
13 - Northumberland
14 - Durham
15 - Ontario
16 - York
17 - Dufferin
18 - Wellington
19 - Waterloo
20 - Halton
21 - Wentworth
22 - Brant
23 - Norfolk
24 - Haldimand
25 - Lincoln
26 - Welland
27 - Monitoulin
28 - Timiskaming
29 - Rainy River

1 - Southern
2 - Western
3 - Central
4 - Eastern
5 - Northern

Ontario
"
"
"
"

counties or districts which are in each study region. (The study regions as defined for this paper are shown by large numbers.)

Generally, the primary dairy industry in both Ontario and Quebec would have to be categorized as an industry of small-size operations since about 50 per cent of all herds were in the size category of 18 to 32 cows (10) (Table 1). Furthermore, almost 70 per cent of all Ontario herds were less than 33 cows in size while, in Quebec, about 82 per cent of all herds fell into this grouping. Of the five Ontario regions, the greatest proportion of small-size herds (less than 33 cows) were in the Eastern and Northern Ontario Regions. In Quebec, the Gaspesie-Lower St. Lawrence and Quebec Regions had the largest proportions of small-size dairy herds (of all the Quebec provincial regions) with about 94 per cent of all herds being less than 33 cows.

12

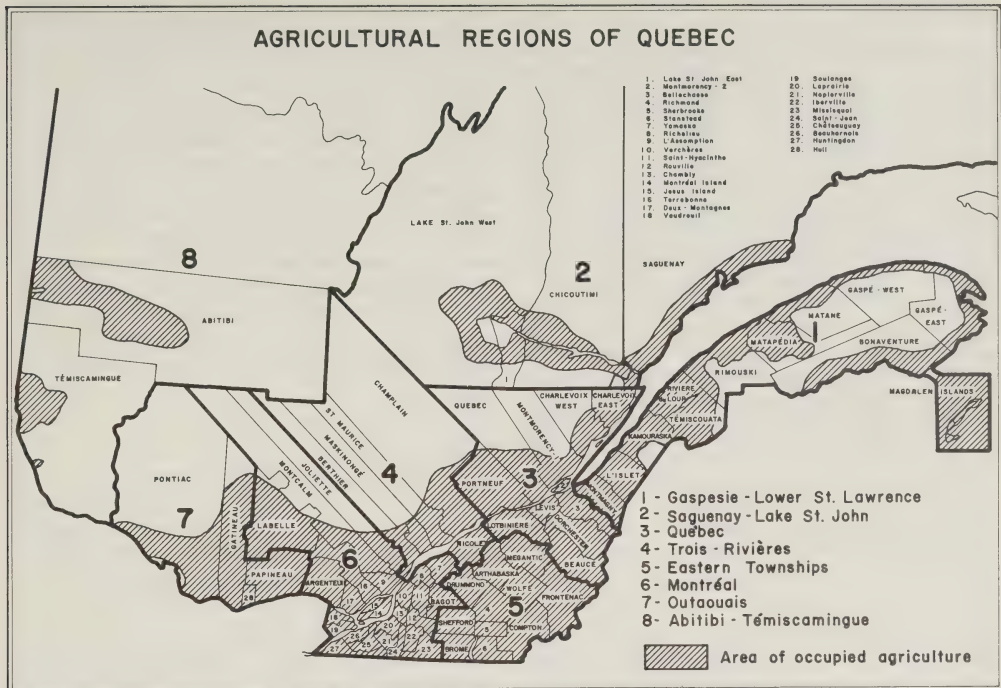


FIGURE 2

TABLE 1—NUMBER OF DAIRY FARMS CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size in Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
number of farms										
Ontario										
1	66	64	312	612	2,367	1,039	348	106	92	5,006
2	58	37	234	575	2,271	1,114	328	83	67	4,767
3	24	25	217	376	1,384	640	182	55	55	2,958
4	85	97	462	1,072	3,580	1,389	443	132	101	7,361
5	14	14	43	114	605	200	49	17	11	1,067
All	247	237	1,268	2,749	10,207	4,382	1,350	393	326	21,159
Quebec										
1	12	19	268	853	1,544	145	17	1	—	2,859
2	10	7	52	206	832	199	42	8	2	1,358
3	8	38	369	1,002	1,758	185	30	3	5	3,398
4	22	17	307	794	1,573	228	34	7	8	2,990
5	49	20	203	746	3,240	1,157	272	60	29	5,776
6	57	69	613	1,466	4,129	1,567	449	108	53	8,511
7	6	7	57	136	324	76	16	7	1	630
8	11	3	61	237	677	86	11	—	1	1,087
All	175	180	1,930	5,440	14,077	3,643	871	194	99	26,609

— = nil.

Size of Farm

Average farm size (total improved acres) of census dairy farms was 152 acres in Ontario and 127 acres in Quebec in 1966 (Table 2). However, in terms of total acres (improved and unimproved), there was much less difference between the two provinces with the average size being 200 acres (± 10 acres). About three-quarters of all census dairy farms in both provinces had less than 240 acres in total. Since improved land represented a higher proportion of the total area per farm in Ontario, 73 per cent compared with 66 per cent in Quebec, effective productive area per farm was 20 per cent greater in Ontario than in Quebec. In both provinces, farms located in the northern regions had the largest average improved acreages. Generally, farms increased in size (improved area) as herd size increased, but at a decreasing rate as shown by the relationships of both improved total acres or improved pasture acres to cow population. The largest farms, in terms of herd size, exhibited the most intensive land use. Total improved acres per cow averaged about five acres in both provinces while acres of improved pasture per cow were 1.3 acres for Ontario farms and 1.5 for Quebec. The acres of improved pasture per cow decreased from three to four acres for the 3 to 7 cow herds to about one acre per cow for herds of 48 cows or more. These figures refer to provincial averages.

Within provinces, cow population per acre was

higher for the more southerly regions, as would be expected. In the Southern Ontario region, for example, the ratio was about one acre per cow for all size groups compared with 1.5 acres per cow in the Northern Ontario region. In Southern Ontario, stocking rate of improved pasture for the largest herd-size group averaged about two-thirds of an acre per cow. The intensive stocking rates for Southern Ontario probably reflect more year-round housing of dairy cattle and extensive use of corn silage in the ration than would be the case for the Northern Ontario Region. In Quebec, the stocking rate for the Montreal Region was 1.2 acres of improved pasture per cow for all size groups compared with about two acres in the Abitibi-Temiscamingue Region.

Capital Investment

The average investment per farm in real estate, machinery and livestock for all Ontario census dairy farms was \$53,530 compared with \$31,145 for Quebec farms (Table 3). These averages were representative of a relatively large number, 40 to 45 per cent, of all census dairy farms in each province. Generally, investment per farm increased with herd size. In Ontario, average investment was least for farms with 8 to 12 cows at \$25,954. It increased for both smaller herds and larger herds, rising to an average of \$186,321 for farms with 78 cows or more.

TABLE 2—AVERAGE SIZE OF DAIRY FARMS IN TOTAL IMPROVED LAND AREA CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size in Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
	acres per farm									
Ontario										
1	107	79	81	96	128	172	228	266	361	143
2	125	86	93	103	136	181	234	281	360	152
3	120	93	91	107	138	192	252	275	466	157
4	88	88	84	102	138	193	240	309	467	152
5	139	73	97	119	164	241	324	360	431	183
All	108	85	87	102	137	187	240	289	414	152
Quebec										
1	102	103	87	101	132	184	225	^a	—	122
2	125	93	98	116	151	196	272	300	^a	154
3	50	62	69	85	109	154	199	356	362	101
4	77	59	78	91	116	169	243	306	373	112
5	102	83	83	98	122	158	204	254	317	131
6	97	77	80	95	123	168	213	281	401	131
7	108	83	103	118	154	211	235	315	^a	152
8	133	147	115	123	159	226	255	—	^a	155
All	98	78	81	97	125	168	215	276	370	127

— = nil.

^a Only one or two farms in group.

TABLE 3—AVERAGE TOTAL CAPITAL INVESTMENT OF DAIRY FARMS CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size in Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
capital investment per farm (dollars)										
Ontario										
1	51,814	35,927	32,651	41,095	56,912	77,302	105,551	124,344	187,871	64,578
2	53,521	27,959	29,373	35,054	52,670	77,874	104,099	120,124	200,013	61,894
3	44,429	29,612	25,405	33,312	49,234	75,417	112,318	133,633	234,398	87,809
4	17,691	23,074	20,370	23,642	33,962	52,302	72,124	94,528	156,483	39,799
5	37,036	21,029	21,514	26,345	37,406	53,785	72,449	81,265	123,536	41,630
All	38,916	27,876	25,954	31,349	45,721	68,174	93,940	112,875	186,321	53,530
Quebec										
1	15,917	14,926	17,906	20,670	27,485	40,173	49,023	^a	—	25,216
2	22,950	28,000	22,813	24,840	33,263	45,802	62,879	76,338	^a	34,532
3	12,412	18,110	17,336	20,800	27,081	41,077	62,263	93,100	235,740	25,474
4	16,050	13,494	18,631	20,101	26,859	37,766	54,438	69,286	90,538	25,479
5	16,798	16,310	18,663	20,346	26,592	37,837	52,805	64,620	102,359	29,650
6	24,105	20,317	22,216	25,741	34,840	51,609	71,149	88,831	136,917	38,498
7	19,700	17,286	20,875	26,157	31,682	51,726	63,512	84,143	^a	33,132
8	14,282	16,733	17,208	19,585	25,668	38,391	40,891	—	^a	25,048
All	19,116	18,314	19,559	22,181	29,667	44,752	63,109	80,036	126,646	31,145

— = nil.

^a Only one or two farms in group.

In Quebec, the lowest average investment was for dairy farms in the 3 to 7 cow herds at \$18,314. Farms with 8 to 12 cows had an average investment of \$19,559. In Quebec, too, as herd size increased from 8 to 12 cows, total investment per farm increased reaching \$126,646 for herds of 78 cows and over.

In Ontario, the average investment per census dairy farm for each of the three categories of capital (real estate, machinery and livestock) exceeded the levels of Quebec dairy farms for all size groups (not shown in the tables). Likewise, the total investment per cow was higher in Ontario than in Quebec with the overall averages being \$1,860 per cow in Ontario and \$1,280 in Quebec. Regionally, the highest investment per farm in Ontario was in the Central Ontario Region while the lowest was in Northern Ontario (Table 3). On a per cow basis, the highest was again in Central Ontario, almost \$3,000, but the lowest investment per cow was in Eastern Ontario, \$1,420. In Quebec, the highest average investments, both per farm (\$38,498) and per cow (\$1,453), were in the Montreal Region. Four of the eight regions in Quebec showed an average investment per farm of about \$25,000. The smallest investment on a per cow basis was in the Eastern Townships Region.

Sales of Farm Products

Sales of farm products (11) by all Ontario census dairy farms averaged \$10,478 per farm in 1966

(Table 4) but sales by dairy farmers in Quebec were considerably less than this at \$6,239. The average for Quebec appeared to be representative of a proportionately larger number of census dairy farms than did the Ontario average. Although the criterion that 51 per cent of total sales must be from dairy products held for all census-farm sizes, dairy farms with less than eight cows reported higher average sales in both Ontario and Quebec than did farms with 8 to 12 and 13 to 17 cows. There would seem to be a number of reasons for this, including such factors as greater production per cow; higher average milk prices; more direct sales to consumers; resale of purchased milk; and ceasing operations (this conclusion is supported by relatively large cattle sales shown for the smallest size groups).

In Ontario, highest average sales of farm products on a regional basis were in Southern Ontario, \$12,618 per census dairy farm. Eastern Ontario recorded the lowest average sales, \$7,858. In Quebec, the average value of sales was somewhat more uniform between regions than was the case for Ontario. Lowest average sales were recorded for the Abitibi-Temiscamingue Region, \$4,731, and the highest for the Montreal Region at \$7,683. Average total sales for farms in the Montreal and Quebec City Regions were significantly higher than in other regions for the herd-size group 63 to 77 cows. There were less obvious differences between regions for the other size groups except for the Abitibi-Temiscamingue

TABLE 4—AVERAGE VALUE OF SALES OF AGRICULTURAL COMMODITIES OF DAIRY FARMS CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size in Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
sales per farm (dollars)										
Ontario										
1	13,816	6,159	10,132	6,771	10,506	16,008	22,408	28,473	41,274	12,618
2	14,780	7,798	5,358	6,022	10,208	15,795	20,123	24,282	38,675	12,135
3	14,801	4,858	4,285	5,492	9,024	14,660	20,440	24,874	45,840	11,140
4	5,449	4,694	3,807	4,248	6,452	10,789	15,328	19,904	30,825	7,858
5	8,668	4,884	4,193	5,471	7,927	12,751	16,679	24,078	30,182	9,277
All	10,967	5,603	4,514	5,402	8,664	13,954	19,056	24,016	37,899	10,478
Quebec										
1	3,996	4,644	3,382	3,689	5,259	8,993	11,931	a	—	4,847
2	4,506	4,197	4,269	3,789	5,117	7,895	10,010	16,228	a	5,502
3	5,665	3,890	3,546	3,916	5,720	9,770	15,000	41,130	27,692	5,297
4	4,798	3,396	3,442	3,772	5,633	9,300	14,501	14,921	22,026	5,341
5	5,695	4,475	3,585	3,708	5,448	8,483	13,037	16,282	21,764	6,316
6	6,480	4,005	3,793	4,295	6,443	11,357	15,728	21,075	29,355	7,683
7	8,525	3,837	3,418	3,962	5,465	10,148	14,058	15,867	a	5,876
8	5,488	4,413	3,373	3,570	4,835	7,446	8,566	—	a	4,731
All	5,736	4,051	3,600	3,914	5,784	9,834	14,344	19,391	25,654	6,239

— = nil.

^a Only one or two farms in group.

TABLE 5—AVERAGE VALUE OF SALES OF DAIRY PRODUCTS OF DAIRY FARMS, CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size In Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
sales per farm (dollars)										
Ontario										
1	8,469	3,622	6,197	4,484	7,426	11,907	17,014	22,201	31,688	9,120
2	8,309	5,474	3,083	3,433	6,678	11,440	15,164	18,327	29,059	8,335
3	9,642	3,166	2,564	3,536	6,572	11,019	15,525	18,669	35,085	8,156
4	3,038	2,892	2,553	2,967	4,799	8,464	12,391	16,068	24,181	5,962
5	5,340	3,156	3,126	4,146	6,596	10,624	13,692	21,470	25,584	7,646
All	6,499	3,537	2,817	3,529	6,173	10,509	14,726	18,797	29,189	7,635
Quebec										
1	2,031	3,220	2,000	2,186	3,386	6,405	9,469	^a	—	3,088
2	2,674	2,299	2,970	2,530	3,699	5,672	7,811	11,709	^a	3,948
3	3,299	2,640	2,248	2,512	3,941	7,360	12,022	31,363	23,714	3,631
4	2,361	2,181	2,409	2,787	4,306	7,478	11,278	12,154	18,741	4,060
5	3,075	3,148	2,376	2,451	3,899	6,422	10,033	13,042	17,614	4,607
6	3,725	2,729	2,642	3,121	5,225	9,489	13,363	17,975	23,661	6,137
7	5,080	2,821	2,162	2,565	3,847	8,070	12,274	13,393	^a	4,253
8	3,012	2,827	2,229	2,518	3,541	5,817	6,064	—	^a	3,447
All	3,177	2,745	2,394	2,659	4,252	7,833	11,740	16,063	20,832	4,658

— = nil.

^a Only one or two farms in group.

Region where sales per farm were lower than in all other regions for size groups 8 to 12 cows and over.

Value of sales of dairy products per census dairy farm (Table 5) reflected much the same relationships noted for sales of all farm products except that

differences between regions could be ascribed presumably to variations in the proportion of total sales going into the higher-priced fluid milk market and to varying production levels per cow. Eastern Ontario dairy farms recorded the lowest average

value of sales of dairy products of any region in Ontario. This relationship held generally for all size groups in Eastern Ontario although this region was only marginally below Central Ontario for the size group 8 to 12 cows. In Quebec, the Gaspésie-Lower St. Lawrence Region had the lowest average sales per farm, \$3,088, followed by the Abitibi-Temiscamingue Region with \$3,447. The Montreal Region had the highest milk sales per farm, \$6,137. The differences in levels of average sales per farm between provinces and within provinces do not imply, however, that differences in net incomes per farm (from farming and/or from all sources) necessarily follow the same pattern.

Age of Farm Operators

More than 55 per cent of all census dairy farm operators in both Ontario and Quebec were aged 35 years to 54 years in 1966 (Tables 6 and 7). The proportion of farm operators 55 years and over was somewhat higher in Ontario than in Quebec. In Quebec, a particularly large proportion of farmers in the Gaspésie-Lower St. Lawrence and Abitibi-Temiscamingue Regions were in the age bracket of 35 to 54 years—75 per cent in the case of farms with 1 to 2 cows in the latter region. With the exception of the 1 to 2 cow herds, the greatest proportion of younger dairy farmers (less than 35 years) were in the 18 to 32 and 33 to 47 cow groups

TABLE 6—PERCENTAGE OF DAIRY FARM OPERATORS, 35 YEARS TO 54 YEARS OF AGE, INCLUSIVE, CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size in Cows and Heifers									All
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	
percentage of all operators										
Ontario										
1	50	38	36	50	57	58	66	58	65	55
2	57	51	48	50	60	63	68	61	61	59
3	46	36	43	53	60	61	58	66	49	58
4	42	26	42	49	56	59	60	59	61	54
5	50	64	46	58	58	62	47	53	64	58
All	49	36	42	50	58	60	63	60	60	56
Quebec										
1	75	68	66	59	60	66	59	^a	—	61
2	40	71	54	56	55	55	62	50	^a	56
3	50	40	50	55	56	64	63	100	60	56
4	36	47	48	56	58	63	53	71	88	57
5	45	45	46	58	56	63	63	62	69	58
6	42	46	48	55	60	61	60	56	47	58
7	50	29	56	54	64	60	62	14	^a	59
8	64	67	57	57	62	57	54	—	^a	60
All	46	48	51	56	58	62	61	58	57	58

— = nil.

^a Only one or two farms in group.

TABLE 7—PERCENTAGE OF DAIRY FARM OPERATORS CLASSIFIED BY HERD SIZE AND AGE GROUP, ONTARIO AND QUEBEC, 1966

Province and Age Group	Herd Size in Cows and Heifers										All
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more		
percentage of all operators											
Ontario											
Less than 35 years....	11	9	8	9	15	15	13	13	13	14	
35 to 54 years.....	49	36	42	50	58	60	63	60	60	56	
55 years and more....	40	55	50	41	27	25	24	27	27	30	
Quebec											
Less than 35 years....	20	9	14	17	19	20	18	14	17	18	
35 to 54 years.....	46	48	51	56	59	61	61	58	57	58	
55 years and more....	34	43	35	27	22	19	21	28	26	24	

in both provinces. Older farm operators seemed to be concentrated in the farm size groups with less than 18 cows, especially in Ontario.

Farm Expenses

The information provided by the 1966 Census of Agriculture on farm operating expenses was limited to a few items (12). However, the data available

provided an indication of the levels of average fixed costs in the form of total investment per unit and of average variable costs in the form of hired labor expenditures per unit for each size group.

In a previous section, total investments per census dairy farm in relation to herd size were discussed. It was noted that investment per farm generally increased as herd size increased (Table 3) with a couple

TABLE 8—AVERAGE COST OF HIRED LABOR OF DAIRY FARMS, CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size In Cows and Heifers									All
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	
cost per farm (dollars)										
Ontario										
1	910	264	154	215	449	1,089	2,011	2,606	5,419	784
2	732	263	151	103	270	846	1,462	1,826	4,780	557
3	592	71	173	199	392	1,042	2,281	2,410	7,490	776
4	182	110	55	119	202	562	1,190	1,918	4,827	401
5	358	68	107	247	248	802	2,160	3,182	3,467	513
All	555	169	119	153	303	840	1,650	2,208	5,388	585
Quebec										
1	63	80	81	71	170	438	1,520	^a	—	154
2	157	357	90	207	281	705	1,684	2,268	^a	391
3	114	126	112	120	152	621	1,465	15,453	16,440	242
4	66	129	114	128	257	518	1,729	1,500	2,296	251
5	275	800	98	133	207	445	1,013	1,450	2,854	306
6	273	152	153	161	220	533	1,027	2,078	4,123	353
7	55	—	80	120	197	853	1,917	624	^a	299
8	177	33	113	142	155	311	824	—	^a	168
All	206	128	118	131	214	516	1,120	2,034	4,267	289

— = nil.

^a Only one or two farms in group.

TABLE 9—SELECTED AVERAGE COSTS PER COW OF DAIRY FARMS, CLASSIFIED BY HERD SIZE, ONTARIO AND QUEBEC, 1966

Province and Expense Item	Herd Size in Cows and Heifers									All
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	
Ontario (All Regions)										
Number of cows	0.3	5.6	10.5	15.2	24.5	38.6	53.5	68.6	104.6	28.8
Total investment ^a . . .	12,972	498	247	206	187	177	176	164	178	186
Hired labor ^b	1,850	30	11	10	12	22	31	32	52	20
Quebec (All Regions)										
Number of cows	0.3	5.9	10.7	15.2	23.7	38.2	53.1	68.4	96.1	24.3
Total investment ^a . . .	6,372	310	183	146	125	117	119	117	132	128
Hired labor ^b	687	22	11	9	9	14	21	30	44	12

^a Investment costs per cow were calculated by taking 10 per cent of the total investment per farm (given in Table 3) and dividing that by the average herd size (in cows) of each size group. This provides a proxy estimate of fixed costs (depreciation and interest on investment) per cow. No significance should be attached to the rate used (10 per cent); it is simply a convenient working figure, but it allows comparisons to be made between size groups and provinces.

^b Hired labor costs per cow were calculated by dividing the average hired labor cost per farm for each size group by the average number of cows in the same group. This provides a proxy of variable costs per cow.

of exceptions. This relationship was to be expected. Likewise, it would be expected that total hired labor costs per farm would increase with herd size. This was shown to be the case, generally, by the data presented in Table 8. Again, the same exceptions were to be noted as with investment per farm. However, in both provinces, average hired labor costs per farm were lowest for herd sizes of 8 to 12 cows. Expenditures for hired labor were lower for all size groups in Quebec than in Ontario with the possible exception of the 8 to 12 cow herds. One factor accounting for part of the difference would be the lower average wage rates for hired labor in Quebec (13).

Costs per cow, both fixed and variable, conformed to the theoretical nature of unit short-run cost curves (14) for both provinces (Table 9). The total fixed cost curve per cow was asymptotic up to the 63 to 77 cow herd-size after which fixed costs per cow appeared to rise. The variable cost curve, as represented by hired labor costs, conformed to the theoretical U-shape, with costs per cow lowest for the 13 to 17 cow herds in Ontario and the 13 to 17 cow and 18 to 32 cow herds in Quebec. It is evident that the majority of dairy farms in Ontario and Quebec were operating at the herd sizes with minimum average variable costs, at least insofar as hired labor is concerned. However, there would appear to be economies in average fixed costs to be realized by expanding herd size.

Although it was possible to define the general shapes of the short-run unit cost curves of Ontario and Quebec census dairy farms in terms of a "fixed cost" curve and a "variable cost" curve, it was not possible to define the absolute levels of these curves nor to describe the shape or absolute levels of the total unit cost curves. A further difficulty, which most readers will recognize, was that unpaid family labor would be relatively more important as an input on small-size farms than would hired labor. This means, therefore, that the data on hired labor costs would likely understate the nature of variable costs on small-size farms more than on larger-size farms.

Off-farm Work By Operators

Generally, the smaller a census-farm, the more the farm operation becomes part-time in nature and the greater are the earnings of the operator from sources other than farming (15). Dairy farmers in Ontario and Quebec were no exception in this respect in 1966 (Table 10). Days worked off the farm in Ontario averaged 26 days per year compared with 32 days by dairy farmers in Quebec. This relationship was consistent with the smaller average investment and sales volume per census dairy farm in Quebec than in Ontario. However, the amount of off-farm work by dairy farmers in Quebec was not consistently higher than in Ontario for all herd sizes and, in the case of the 13 to 17 cow herds, the difference, if any, was only slight. Generally, days of off-

TABLE 10—DAYS OF OFF-FARM WORK BY OPERATORS OF DAIRY FARMS, CLASSIFIED BY HERD SIZE AND REGION, ONTARIO AND QUEBEC, 1966

Province and Region	Herd Size In Cows and Heifers									
	1 to 2	3 to 7	8 to 12	13 to 17	18 to 32	33 to 47	48 to 62	63 to 77	78 and more	All
	number of days per operator annually									
Ontario										
1	66	80	52	30	21	14	12	5	22	23
2	44	96	59	42	19	13	14	11	8	23
3	32	43	42	40	19	12	10	13	30	22
4	82	76	64	49	29	16	12	12	22	31
5	44	46	26	55	30	14	12	7	16	28
All	62	75	55	42	24	14	12	10	20	26
Quebec										
1	33	41	46	40	30	16	29	^a	—	34
2	94	87	63	46	42	28	24	10	^a	41
3	6	42	43	36	29	16	2	—	60	32
4	40	90	40	41	22	14	25	15	34	29
5	100	75	64	53	36	22	12	8	27	35
6	82	40	49	40	25	11	5	8	7	26
7	64	42	54	37	28	20	19	5	^a	32
8	81	80	88	82	52	32	34	—	^a	59
All	75	52	49	43	30	16	10	8	18	32

— = nil.

^aOnly one or two farms in group.

farm work declined as herd size increased in both provinces except that a reversal of trend occurred for the largest herd sizes, that is, 78 cows and over. A number of reasons could be hypothesized for this but one possibility would be that, on very large farms, farm operators have more diversified (farm and non-farm) business interests. Since the hired labor input becomes relatively more important on the largest farms, it suggests, too, that the input of the farm operator for the largest size herds is mostly in the form of management.

Some regional differences in the amount of off-farm work were evident. In Ontario, Eastern Ontario census dairy farmers averaged the greatest number of days of off-farm work while in Quebec, it was the farmers in the Abitibi-Temiscamingue Region where the days of off-farm work averaged more than two months a year. Again, these differences were consistent with other regional differences noted with respect to farm investment and sales volume. Although no information was available from this study on the nature of the off-farm work, it likely would be largely connected with lumbering and pulpwood cutting (16).

Changes in Dairying Since 1966

The discussion in this paper has been based upon the size structure and spatial distribution of the primary dairy industry as it existed in 1966. Obviously, since farming is a dynamic industry, there

must have been continuing changes since then that would have had an effect. The extent of some of these changes can only be tentatively hypothesized and more definitive descriptions will have to await the 1971 census. However, it is possible to examine some of the significant indicators of change and hypothesize as to the nature of the shifts with which they would be associated in industry structure and spatial distribution.

Data from the Canadian Dairy Commission (Table 11) indicate that the number of producers of manufacturing milk and cream (and by implication all producers of milk) continued to decline in both Ontario and Quebec. However, the total amount of product shipped increased in Quebec while declining in Ontario. This trend was supported by the Dominion Bureau of Statistics estimates of total milk production (Table 12). Production in Quebec was up by almost 12 per cent in 1969 compared with the 1966 level but down by 2.7 per cent in Ontario. Milk cow numbers were also greater in Quebec, up by almost five per cent. The CDC data indicate a continuing shift, for Canada as a whole (and by implication, for Ontario and Quebec), to larger-size herds (17). Producers registered with the CDC and shipping less than 700 pounds of butterfat (18) decreased by 17 per cent from 1966-67 to 1968-69. There was an increase of almost 80 per cent in the number of shippers of 6,300 pounds or more of butterfat between these two years.

TABLE 11—CHANGES IN THE PRODUCTION OF MANUFACTURING MILK AND CREAM, CANADA, ONTARIO AND QUEBEC, 1966-67 TO 1968-69

	1966-67	1967-68	1968-69	Percentage Change 1966-67 to 1968-69
Number of producers				
Canada.....	165,061	149,457	130,464	-21.0
Quebec.....	53,342	49,660	45,420	-14.9
Ontario.....	36,515	32,208	28,260	-22.6
Quantity of butterfat				
	thousand pounds			
Canada.....	345,094	339,511	346,748	+ 0.5
Quebec.....	144,377	149,285	158,955	+10.1
Ontario.....	123,173	117,759	117,523	- 4.6
Butterfat shipped per producer				
	pounds			
Canada.....	2,091	2,272	2,658	+27.1
Quebec.....	2,707	3,006	3,500	+29.3
Ontario.....	3,373	3,656	4,159	+23.3
Percentage of producers by size of annual shipments				
	per cent			
Canada				
Less than 700 pounds.....	32.0	31.4	26.5	-17.2
700 to 2,099.....	33.1	30.8	29.9	- 9.7
2,100 to 4,199.....	20.8	21.2	22.3	+ 7.2
4,200 to 6,299.....	8.3	9.1	10.9	+31.3
6,300 and more.....	5.8	7.5	10.4	+79.3

Source: W. Y. Yang, "Changes in Producers' Shipments of Manufacturing Milk and Cream Under the Operation of the Canadian Dairy Commission," *Canadian Farm Economics*, Vol. 5, No. 1, April 1970, pp. 25 to 32.

The value of dairy products sold per cow has increased also, in part due to rising prices but also due to increased production per cow, at least in Quebec. From 1966 to 1969, production per cow increased by 6.7 per cent in Quebec but apparently declined by 1.2 per cent in Ontario (Table 12). Prices of both fluid milk and milk for manufacturing have increased since 1966 (Table 13). The increase for fluid milk up to 1969 was 20 to 21 per cent while for manufacturing milk, it was 8 to 10 per cent. Increases in fluid milk prices between these two years were higher in Ontario and Quebec than in the rest of Canada.

Investment per farm (or per cow) also has increased since 1966, partly due to larger-size herds but also due to rising real estate and livestock values. The average value per acre of farmland sold in Quebec increased from 1966 to 1969 by 17 per cent while the increase for Ontario was over 50 per cent (19). Since these are sales data for all types and locations of farms, they cannot be considered representative of dairy farms. However, the data indicate that land values generally have been rising

during the period reviewed. Increases also occurred in prices of dairy cows (20). Average values for female stock over two years of age and used for milking purposes rose by 20 per cent in Quebec and by 18 per cent in Ontario from 1966 to 1968. The increase for all of Canada was about 16 per cent.

With the general increase since 1966 in the average size of dairy farm operations (Table 11), a decline in the amount of off-farm work by dairy farmers might be expected to be associated with this trend. A survey of the 1969 CDC quota applicants appears to support this hypothesis in part. The survey found only 12 per cent of the quota applicants reporting off-farm work in Quebec and 14 per cent in Ontario (21). This might suggest that a relatively greater decrease has occurred since 1966 in the amount of off-farm work by dairy producers in Quebec than in Ontario. However, the CDC data also indicate that small volume shippers of manufacturing milk and cream, who normally engage in more off-farm work than other shippers, declined proportionately more in numbers in Ontario than in Quebec between the same years (22).

TABLE 12—TOTAL MILK PRODUCTION, NUMBER OF COWS KEPT FOR MILKING AND AVERAGE PRODUCTION, CANADA, ONTARIO AND QUEBEC, 1966 TO 1969

Year	Milk Production ^a			Cows for Milking ^b at June 1			Production per Cow ^c		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	million pounds			thousand head			pounds		
1966.....	6,416.5	6,801.5	18,373.2	995	909	2,674	6,449	7,482	6,871
1967.....	6,563.9	6,646.0	18,208.0	1,004	925	2,668	6,538	7,185	6,824
1968.....	6,732.9	6,653.8	18,361.6	1,023	905	2,616	6,582	7,352	7,019
1969.....	7,176.0	6,614.8	18,698.1	1,043	895	2,584	6,880	7,391	7,236
Percentage change					per cent				
1966 to 1969.....	+11.8	-2.7	+1.8	+4.8	-1.6	-3.4	+6.7	-1.2	+5.3

^aFor all purposes: sold, used in farm homes and fed on farms including skim milk and buttermilk.

^bCows and heifers, two years old and over, milking or to be milked, dairy and non-dairy types.

^cCows for milking at June 1 divided into total estimated milk production as defined in footnote a.

Source: *Dairy Statistics 1969*, Cat. No. 23-201, May 1970, Tables 1 and 5, Dominion Bureau of Statistics.

TABLE 13—AVERAGE PRICES TO PRODUCERS OF DAIRY PRODUCTS, CANADA, ONTARIO AND QUEBEC, 1966 TO 1969

	Manufacturing Milk ^a			Fluid Milk ^b		
	Ontario	Quebec	Canada	Ontario	Quebec	Canada
	dollars per hundredweight					
1966.....	3.06	3.12	3.08	5.36	5.14	5.35
1967.....	3.28	3.32	3.30	5.82	5.70	5.80
1968.....	3.31	3.33	3.31	6.11	5.79	6.02
1969.....	3.32	3.43	3.37	6.45	6.22	6.34
Percentage change 1966 to 1969...	+8.5	+9.9	+9.4	+20.3	+21.0	+18.5

^aExcludes cream sold as butterfat for butter manufacture.

^bExcludes fluid milk sold for fluid cream.

Source: *Dairy Statistics 1969*, Cat. No. 23-201, May 1970, Table 8, Dominion Bureau of Statistics.

How are these changes likely to have been reflected in the structure and geographic distribution of the primary dairy industry in the past few years? Although the absolute levels of many of the parameters given in this paper for 1966 will have increased, especially those in dollars, some may not have changed significantly. The proportion of herds falling into the smaller herd-size categories has probably declined, particularly for all census-farms. However, for the specialized census dairy farms analyzed in this study, it may be shown subsequently that, as of 1970 or 1971, there may not have been much change in several key areas. It was noted that approximately 50 per cent of all dairy herds were in the 18 to 32 cow herd-size in both Ontario and Quebec (Table 1) and that the average herd size of all herds was somewhat larger in Ontario (29 cows) than in Quebec (24 cows) (Table 9). Key parameters such as these would likely be relatively more stable in the short run (five years) and at the provincial level than would production per cow, for example. It is likely, too, that changes in parameters have been greater in certain regions. As was noted (17), there is evidence that average herd size has increased more since 1966 in those regions which had the smallest herds than in other regions.

SUMMARY AND CONCLUSIONS

This paper has been an attempt to characterize the production side of the Canadian dairy industry in the provinces of Ontario and Quebec. In Ontario, it was noted that in 1966, there were more than 21,000 census-farms (with sales of farm products of \$2,500 and over) that were classified as census dairy farms. Average size of herd was almost 29 cows and sales per farm of dairy products were valued at \$7,635. Seventy per cent of all herds were less than 33 cows in size.

The situation in Quebec in the same year was somewhat different with herds being generally smaller in size on average, or 24 cows. There also was found to be a greater concentration of small-size herds with almost 82 per cent of all herds being of less than 33 cows. Sales per farm of dairy products averaged \$4,658. Operators of dairy farms in Quebec appeared to be somewhat younger (less than 35 years of age) than did their Ontario counterparts, regardless of herd size.

Total incomes of dairy farm operators from farming and non-farm activities combined would appear to have been less on average in Quebec than in Ontario in 1966. The smaller farm product sales per farm were offset in the former province by a greater amount of off-farm work to the extent of

only about a week more. However, while Ontario as a whole appeared to be more favorably endowed in its dairy farming sector than did Quebec as a whole, dairy farms in the Eastern and Northern Ontario Regions had more economic and physical characteristics in common with dairy farms in most Quebec regions than they did with other Ontario regions.

Since 1966, the changes in dairy farming in the two provinces appear to have differed in several ways, especially for the manufacturing milk sub-sector. The decrease in the total numbers of shippers was less in Quebec than in Ontario but there was a greater relative decrease in numbers of small-size shippers in Ontario. Production of dairy products (in total) rose in Quebec while declining in Ontario so that the volume shipped by each producer has, on average, increased more in Quebec than in Ontario. Since 1966, prices for both manufacturing milk and fluid milk have increased. The rise was about one per cent more in Quebec than in Ontario. Thus, tentatively we might conclude that relative adjustments in the two provinces have been such that by 1971 the average census dairy farm in Quebec may more closely resemble the average census dairy farm in Ontario than it did in 1966. However, the effects of adjustments at the regional level within a province are more difficult to evaluate since regional differences are the result of both climatic and economic factors. The regional differences noted, both within each province and between provinces, support the conclusion that the limited alternative agricultural opportunities to dairy farming in most of Quebec, Eastern and Northern Ontario are the most inhibitory factors to adjustment to changing technology and market conditions. The implication is, therefore, that government policies, rather than strictly economic factors, will be the deciding forces in shaping the future structure and total size of the dairy industry in these regions.

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NOTES AND REFERENCES

(1) One of the difficulties of using published census data on dairy farms for structural analysis purposes is that the data customarily have been classified by value of sales rather than by herd size in cow numbers. Since the dairy industry is largely one with a two-price system, that is, fluid milk and manufacturing milk, average product price is not constant for all producers but varies according to the proportion of total sales going to the higher-priced fluid milk market. For this reason alone, value of sales is not a suitable proxy measure of herd size since fluid milk farms tend to have a greater capital investment per cow for comparable size herds than do manufacturing milk farms. Furthermore, as dairy farms become larger in herd size, they tend to become primarily fluid milk farms.

(2) Since the agricultural census in 1966 was based on a complete 100 per cent enumeration, means derived from this census characterize the population or subpopulations and hence may be described as "parameters" rather than as "statistics" as would be the case for population samples. See: R.G.D. Steel and J. H. Torrie, *Principles and Procedures of Statistics*, McGraw-Hill, New York, 1960.

(3) The size classifications used in the study correspond to those employed by the Census of Agriculture for the tabulation of numbers of milk cows and heifers on all census-farms (1966 *Census of Canada: Agriculture*, Cat. No. 96-906, Table 10, Dominion Bureau of Statistics) except that the open-ended upper size-category was reduced from 93 or more cows to 78 or more cows because of the small number of herds in the largest size-category. Table 9 of this study indicates that the group averages for each size-category were close to the mid-points for each size-category with the exception of the smallest (1 to 2 cows and heifers). For purposes of this study, herd size was measured in total numbers of cows and heifers, two years old and over, on census dairy farms at June 1.

(4) *Farm Cash Receipts, 1969*, Cat. No. 21-001, Quarterly, Dominion Bureau of Statistics. Dairy supplementary payments were included as a part of the dairy farm receipts but income from sales of cattle and calves was not. If the sale of beef of dairy origin were included, then the dependence upon dairying would be shown to be considerably more than the proportions given.

(5) *1966 Census of Canada: Agriculture*, Cat. No. 96-601, Table 3, Dominion Bureau of Statistics. These data refer to agricultural holdings as defined for census purposes having sales of \$2,500 and over in the 12-month period prior to the census at June 1. In order to qualify as a dairy census-farm, 51 per cent or more of the total sales of agricultural products had to be obtained from the sales of dairy products, or 40 to 50.9 per cent obtained from dairy products provided that the sale of dairy products together with the sales of cattle and calves amounted to 51 per cent or more of total sales of agricultural commodities.

(6) Two years old and over, milking or to be milked, on census-farms at June 1.

(7) *1966 Census of Canada: Agricultural Trends in Canada*, Cat. No. 99-603, Table 1, Dominion Bureau of Statistics and *1966 Census of Canada: Data for Census-Farms and Commercial Farms*, Cat. No. 96-626, Table 1, Dominion Bureau of Statistics.

(8) See: *Agricultural Statistics for Ontario, 1968*, Ontario Department of Agriculture and Food, Pub. No. 20. The

study regions chosen by number and name were as follows:

1. Southern Ontario
2. Western Ontario
3. Central Ontario
4. Eastern Ontario
5. Northern Ontario.

The boundaries of these regions correspond generally (not entirely) to the boundaries of the Ontario milk distribution areas specified by the Ontario Milk Marketing Board.

(9) Several agricultural regions, as specified by the Quebec Department of Industry and Commerce (Q.D.I. and C.), were combined into one region for purposes of this study. The Saguenay-Lake St. John Region includes the Q.D.I. and C. region of the same name plus their North Shore Region. Also, the Montreal Region includes the Q.D.I. and C. region of the same name plus the Metropolitan Montreal Region specified by the Q.D.I. and C. The study regions chosen by number and name were as follows:

1. Gaspesie-Lower St. Lawrence
2. Saguenay-Lake St. John
3. Quebec
4. Trois Rivières
5. Eastern Townships
6. Montreal
7. Outaouais
8. Abitibi-Temiscamingue.

(10) Henceforth, in this paper, whenever the word "cows" is used, it is to be understood that it refers to the census count of all cows and heifers, two years old and over, on farms at June 1, 1966, unless otherwise specified.

(11) Agricultural sales enumerated for census purposes included the value of sales of all agricultural products sold, traded or exchanged whether received by the designated farm operator or some other person. For tenant-operated farms, the landlord's share was included in the total sales. Agricultural sales generally refer to the 12-month period, June 1, 1965 to May 31, 1966. However, if the farm operator preferred to report sales for the calendar year 1965, this was accepted. Government payments were intended to be included with the value of sales of the particular commodity to which the payment applied. Crop insurance payments were reported separately. If no sales were reported due to commencing farming, an estimate of potential sales, based on land use and livestock numbers, made by the Census of Agriculture was used.

(12) The agricultural census provided an estimate of the "market values" of land and buildings regardless of tenure; machinery and equipment; and livestock and poultry on farms. These data provide an approximation of fixed costs (depreciation and interest on investment) in relation to farm size. Information collected on variable expenses included "cash" wages paid to hired agricultural labor, real estate taxes, and rent (cash or share). The hired labor expenditure item was the only item of the three which provided some measure of variable expenses in relation to herd size.

(13) Provincial average farm wage rates at May 15, 1966 (without board) were as follows:

	Ontario	Quebec
Hourly	\$ 1.31	\$ 1.11
Daily	\$ 9.90	\$ 8.80
Monthly	\$236.00	\$186.00

Source: *Farm Wages in Canada*, May 1966, Cat. No. 21-002, Dominion Bureau of Statistics.

- (14) For a discussion of the theory see: C. E. Ferguson, *Microeconomic Theory*, Irwin, 1966, Chapter 8, pp. 162 to 191.
- (15) See: J. M. Fitzpatrick and C. V. Parker, "Distribution of Income in Canadian Agriculture", *Canadian Journal of Agricultural Economics*, Vol. XIII, No. 2, 1965, pp. 47 to 64 for a discussion of this relationship based on a national survey of farm family income (from all sources) and expenditures in 1958.
- (16) The 1961 Census of Agriculture, Dominion Bureau of Statistics, indicated that about one-quarter of the off-farm work by farmers in Quebec was in the cutting of wood for lumber or pulp.
- (17) In Ontario, data for the Dairy Herd Improvement Associations indicate that the greatest rate of increase in herd size in recent years has been in the regions which had the smallest average herd sizes in 1966, that is, Eastern and Northern Ontario.
- (18) Includes all milk sold for manufacturing purposes as well as cream sold as butterfat.
- (19) Based on farmers' reports of actual farmland sales.
- (20) Agriculture Division, Livestock and Animal Products Section, Dominion Bureau of Statistics.
- (21) W. Y. Yang, "Quota Applicants of the Canadian Dairy Commission in 1969 and Their Indicated Intentions", *Canadian Farm Economics*, Vol. 5, No. 2, June 1970, pp. 6 to 21. The proportions cited refer to manufacturing

milk and cream shippers only and are based on 23,162 replies from Ontario producers and 37,952 Quebec producers' replies.

- (22) Percentage changes from 1966-67 to 1968-69 in numbers of manufacturing milk and cream shippers registered with the Canadian Dairy Commission and classified by volume shipped were:

Volume Shipped	Quebec	Ontario
thousand pounds of whole milk equivalent	percentage change	
Less than 10	-45	-46
10 to 19	-39	-41
20 to 29	-36	-40
30 to 39	-32	-37
40 to 59	-29	-31
60 to 79	-22	-31
80 to 99	-16	-20
100 to 119	- 5	-17
120 to 143	+ 5	-16
144 to 159	+18	-14
160 to 179	+27	- 2
180 and more	+76	+15
All	-15	-23

Source: These percentages are based on data published as part of the Canada totals by W.Y. Yang, "Changes in Producers' Shipments of Manufacturing Milk and Cream under the Operation of the Canadian Dairy Commission," *Canadian Farm Economics*, Vol. 5, No. 1, April 1970. pp. 25 to 32.



L. E. Philpotts

THE USE OF COLOR INFRARED AERIAL PHOTOGRAPHY IN ESTIMATING LOSS IN WHITE BEAN PRODUCTION IN HURON COUNTY, ONTARIO, 1968



V. R. Wallen

During the last few years, work has commenced on the use of aerial photography, to survey the state of disease in, and physical change to, agricultural crops in Canada. At present, there is a need to establish methods to measure the losses from these factors.

This report deals with the use of color infrared aerial photography to estimate physical and financial loss, including that caused by bacterial blight, in white beans in the vicinity of Hensall, in Huron County, Ontario in 1968.

It is possible with the use of color infrared aerial photography to interpret certain physical phenomena and to associate these with loss of yield. It is not possible, of course, to extract from aerial photographs the capital outlay by the farmer for labor, machinery and materials used to spray and/or fertilize, and/or drain a field of white beans, and this report does not in any way deal directly with such. However, it is possible to associate and to measure the physical data interpreted from color infrared aerial photographs with the yield data given by the farmer, and to measure the comparative loss between a good yield and a poor yield realized in the same physical or geomorphic environment.

Furthermore, by defining the reason for losses, the study points out the potential for increased yields in the same geomorphic areas without the need for additional acreage.

STUDY AREA

In the summer of 1968, slightly more than five square miles in the vicinity of Hensall, Ontario were photographed aerially in the color infrared medium in an attempt to interpret and measure bacterial blight in white bean fields (1).

Success in interpreting several pertinent physical phenomena within the fields indicated that it would be possible to calculate here the financial loss from blight.

Thirty-five white bean fields were identified and their physical characteristics were interpreted from the color infrared aerial photography. Reliable yield data for 25 of these were obtained from the farmers. Bean crops in this area are grown under contract and yield data is available for the various fields from the growers who are paid by the pound of seed.

METHOD

Photographic Interpretation

To estimate the loss to the producer from blight, several physical and economic factors of the individual fields of white beans must be known. These factors include the aerial photographic interpretation of:

- a) the areas of blight;
- b) the producing acreage, which excludes the permanent non-producing man-made surface drains, trees, and roughage and stone piles;
- c) the non-producing but arable acreage, including that where the plants did not mature sufficiently and/or where the plant has gone completely;
- d) the vigor of the crop, calculated by a density measurement of the percentage of reflection, indicative of the amount of chlorophyll in the plants (2);
- e) the areas containing weeds; and
- f) the soil.

Acreage Measurement

The acreage of the bean fields was measured by the drawing, by hand, of the outline of an area or

field on stable transparent material and putting this material through an IBM drum scanner (3) (4).

Basis for Loss Calculations

Because of the complexity of the physical phenomena which may be found in a field of white beans due to flood or high water table, drought, disease and insect damage, spraying, fertilizing, and damage or omissions caused by machinery, it was necessary to establish a basis from which to calculate comparative loss (6).

Calculations were made in an attempt to correlate yield data with soil type, with producing acreage, with the vigor of the crop as expressed by percentage of reflection from the foliage, and with amount of blight. The results showed that a percentage of a soil type within an individual field was the most

reliable basis upon which to establish relationships for estimating loss.

The two main soil types found in the fields studied were the imperfectly-drained Perth clay loam and the poorly-drained Brookston clay loam (5).

Table 1 indicates the number of fields and the acreage according to the percentage of imperfectly-drained clay loam found within a field of white beans, and Table 2 shows the yield and percentage of reflection.

To estimate the loss for all the physical factors, including blight, it was necessary to find the average yield for the top-producing fields in each of the categories of fields. It was then assumed that these yields represented the best opportunity or the target of production within the relative category. Therefore, the loss is simply a comparative measurement between a good yield such as the average yield of the best group of fields having a percentage range of a type of soil therein, and a poor yield found in the same group of fields. However, the various types of loss which indicate the difference between these fields are interpreted and measured from color infrared aerial photographs.

There were five categories of loss estimated:

- 1) the total loss;
- 2) the non-producing arable acreage loss;
- 3) the percentage of reflection or vigor loss;
- 4) the blight loss; and
- 5) other loss.

The loss because of blight in white beans was calculated by finding the difference between the total physical loss of a field and the sum of the loss of the non-producing but arable areas and the loss pertinent to the percentage of reflection or vigor of

TABLE 1—NUMBER OF FIELDS AND ACREAGE ACCORDING TO THE PERCENTAGE OF IMPERFECTLY-DRAINED CLAY LOAM WITHIN A FIELD OF WHITE BEANS

Percentage of imperfectly-drained clay loam in a single field	Number of fields	Acreage ^a		
		Total	Average	Range
90 to 100 per cent				
Top-producing fields	6	107	17.8	2.1 to 42.6
Remaining fields	5	73	14.6	2.4 to 24.0
Both categories	11	180	16.4	2.1 to 42.6
70 to 89 per cent				
Top-producing fields	4	43	10.7	1.7 to 20.0
Remaining fields	2	44	22.0	8.5 to 35.5
Both categories	6	87	14.5	1.7 to 35.5
40 to 69 per cent				
Top-producing fields	4	99	24.7	8.3 to 50.0
Remaining fields	4	174	43.5	13.0 to 69.3
Both categories	8	273	34.1	8.3 to 69.3
All fields	25	540	21.2	1.7 to 69.3

^a In the actual calculations, the acreage data were determined to two decimal places because of the accuracy of the electronic scanning equipment and the need to subtly measure very small-sized areas of blight, missing plants and other non-producing areas.

TABLE 2—YIELD AND PERCENTAGE OF REFLECTION ACCORDING TO THE PERCENTAGE OF IMPERFECTLY-DRAINED CLAY LOAM WITHIN A FIELD OF WHITE BEANS

Percentage of imperfectly- drained clay loam in a single field	Number of fields	Yields of beans		Percentage of reflection from plants	
		Average	Range	Average	Range
		pounds per acre		per cent	
90 to 100 per cent					
Top-producing fields.....	6	2,121	1,999 to 2,245	72.1	70.1 to 74.8
Remaining fields.....	5	1,660	1,424 to 1,920	69.3	66.4 to 73.0
Both categories.....	11	1,969	1,424 to 2,245	70.9	66.4 to 74.8
70 to 89 per cent					
Top-producing fields.....	4	1,689	1,620 to 1,805	69.6	66.8 to 71.8
Remaining fields.....	2	1,008	600 to 1,416	68.0	66.7 to 69.3
Both categories.....	6	1,462	600 to 1,805	69.0	66.8 to 71.8
40 to 69 per cent					
Top-producing fields.....	4	1,588	1,420 to 1,860	67.4	65.0 to 69.6
Remaining fields.....	4	1,256	1,056 to 1,364	68.2	62.8 to 72.0
Both categories.....	8	1,314	1,056 to 1,860	67.4	62.8 to 72.0
All fields.....	25	1,556	600 to 2,245	69.5	62.8 to 74.8

the plants within the field (7). (However, where it is interpreted from the aerial photographs that no blight is found in a field, or a loss, if such exists, cannot be identified, then such loss is considered as *other loss*) (8).

RESULTS OF LOSS CALCULATIONS

Total Loss

The average loss per acre of white beans for the entire area (25 fields) was \$20.65. Where the fields contained from 90 to 100 per cent of the imperfectly-drained (comparatively better) clay loam soil, the average loss was \$16 an acre. The loss was \$19 an acre in the fields with 70 to 80 per cent of this soil type, and where the fields had only 40 to 69 per cent imperfectly-drained clay loam, the average loss was just over \$24 an acre.

Table 3 points out the loss per acre according to the types of loss in relation to the percentage of imperfectly-drained clay loam within a field and Table 4 shows range of loss.

Almost half of the total loss was attributed to blight (Figure 1).

Loss from the Non-producing But Arable Areas

About 68 per cent of the total area of non-producing but arable soil was found in the fields containing the larger amounts of poorly-drained clay loam. This situation is probably due to the water table problems associated with this type of soil. The problems may be connected with the actual seeding operations and those associated with early plant growth. The average loss for fields with 90 to 100 per cent of this soil type was \$1.60 an acre compared with the overall average of \$1.20 an acre.

TABLE 3—LOSS PER ACRE BY TYPE OF LOSS, ACCORDING TO THE PERCENTAGE OF IMPERFECTLY-DRAINED CLAY LOAM WITHIN A FIELD OF WHITE BEANS

Percentage of imperfectly-drained clay loam in a single field	Number of fields	Type of loss									
		Non-productive but arable areas ^a		Percentage of reflection		Blight		Other ^b		Total	
		dollars	per cent	dollars	per cent	dollars	per cent	dollars	per cent	dollars	per cent
90 to 100 per cent											
Top-producing fields . . .	6	1.37	39.9	1.52	44.3	.54	15.8	0	0	3.43	100
Remaining fields	5	.19	0.6	7.61	22.2	24.37	71.1	2.09	6.1	34.26	100
Both categories	11	.90	5.6	3.99	25.0	10.19	64.0	.85	5.4	15.93	100
70 to 89 per cent											
Top-producing fields . . .	4	0	0	.49	24.1	1.53	75.9	0	0	2.02	100
Remaining fields	2	1.05	2.9	1.42	4.0	16.30	45.7	16.92	47.4	35.69	100
Both categories	6	.53	3.0	.96	5.0	9.00	47.0	8.57	45.0	19.06	100
40 to 69 per cent											
Top-producing fields . . .	4	1.23	11.3	1.46	13.3	4.64	42.2	3.65	33.2	10.98	100
Remaining fields	4	1.81	5.7	3.50	11.0	12.86	40.3	13.70	43.0	31.80	100
Both categories	8	1.60	6.6	2.76	11.4	9.87	41.0	10.04	41.0	24.27	100
All fields	25	1.19	5.8	2.88	14.0	9.84	47.6	6.74	32.6	20.65	100

^a Including where plants did not mature sufficiently and/or where the plant has gone completely.
^b Including the effect of weeds, root rot, and the effect of variance in the water table.

TABLE 4—RANGE OF LOSS PER ACRE BY TYPE OF LOSS, ACCORDING TO THE PERCENTAGE OF IMPERFECTLY-DRAINED CLAY LOAM WITHIN A FIELD OF WHITE BEANS

Percentage of imperfectly-drained clay loam in a single field	Number of fields	Type of loss						
		Non-productive but arable areas ^a	Percentage of reflection	Blight		Other ^b	Total	
dollars								
90 to 100 per cent								
Top-producing fields.	6	0(1.99)–2.21	0(1.74)–	4.81	0	–10.13	0	0(1.74)–10.13
Remaining fields. . . .	5	0	–1.06	0(5.61)–13.83	0(11.07)–50.43	0	–11.50	0(1.06)–50.43
Both categories.	11	0(1.06)–2.21	0(1.74)–13.83		0(10.12)–50.43	0	–11.50	0(1.06)–50.43
70 to 89 per cent								
Top-producing fields.	4	0	0(.60)–	5.73	0(.75)–	2.63	0	0(.60)–
Remaining fields. . . .	2	0	–1.29	0(.41)–	5.64	0	–84.24	0
Both categories.	6	0	–1.29	0(.41)–	5.73	0(.75)–84.24	0	–20.95
40 to 69 per cent								
Top-producing fields.	4	0	–2.46	0	–	4.73	0(9.33)–21.61	0
Remaining fields. . . .	4	0(1.39)–3.14	0	–	8.78	0	–32.24	0(1.70)–26.24
Both categories.	8	0(1.39)–3.14	0(4.73)–	8.78	0(9.33)–32.34	0(1.70)–26.24	0	0(1.39)–32.24
All fields	25	0(1.06)–3.14	0(.41)–13.73		0(.75)–84.24	0(1.70)–26.24	0	0(.41)–84.24

Note: Figures in brackets represent the lowest amount of loss in a field actually containing a loss.
^a Including where a plant did not mature sufficiently and/or the plant has gone completely.
^b Including the effect of weeds, root rot, and the effect of variance in the water table.

TOTAL LOSS ACCORDING TO THE TYPE OF LOSS IN RELATION TO THE PERCENTAGE OF IMPERFECTLY DRAINED CLAY LOAM

LOSS IN DOLLARS

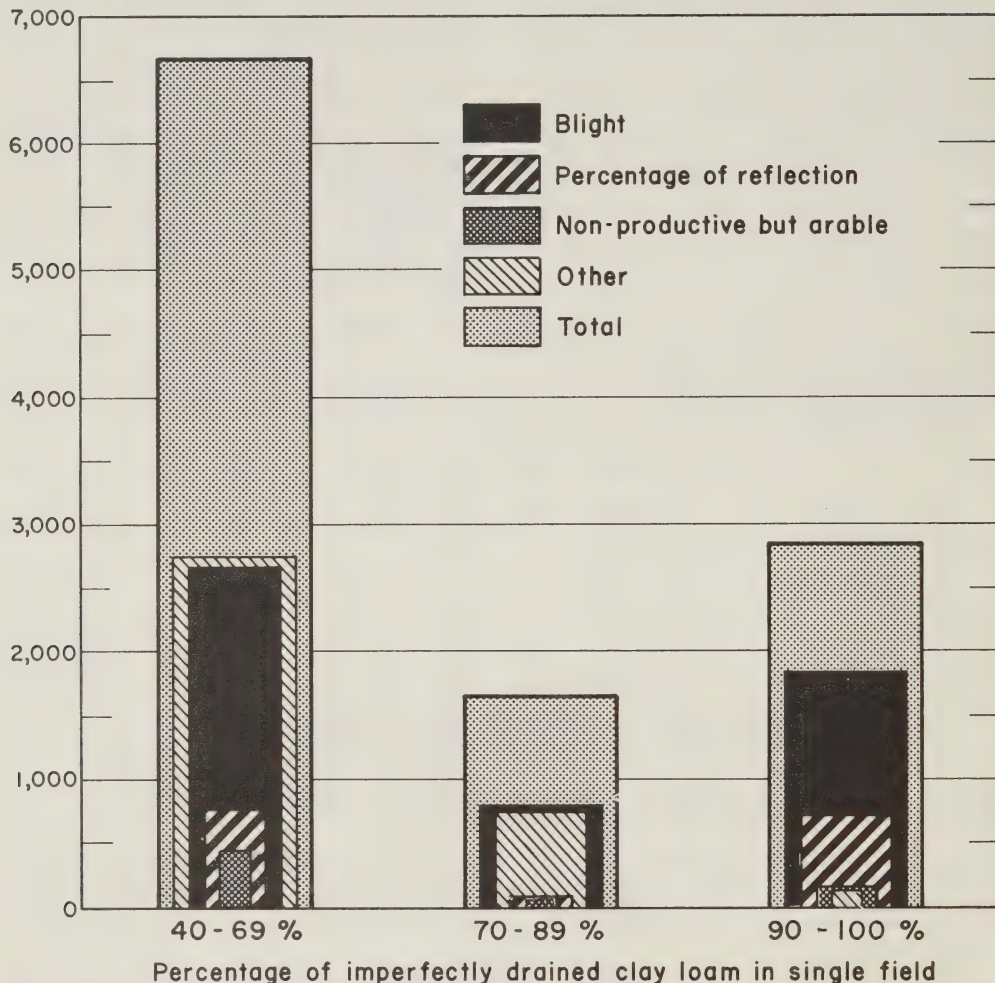


FIGURE 1

Percentage of Reflection or Vigor Loss

The average vigor loss per acre was just less than \$2.90. The average loss ranged from \$1 an acre to about \$4 an acre in fields that had from 90 to 100 per cent of the imperfectly-drained clay loam.

Blight Loss

About 73 per cent of the total blight acreage was found in the fields with only 40 to 60 per cent imperfectly-drained clay loam. On the other hand, just over 13 per cent was found in the fields with from 90 to 100 per cent of this soil type.

More than 47 per cent of the total loss was caused by blight in the area studied. The average loss per acre from blight was \$9.84. However, in the fields where blight was actually found, the loss ranged from 75 cents an acre to more than \$84 an acre.

Although the group of fields with from 90 to 100 per cent of the better soil had blight on only 1.6 per cent of its total acreage, the gross loss was the highest here of all the categories because of the greater production potential from this soil. On the other hand, in the fields containing only 40 to 69 per cent of the imperfectly-drained clay loam, the blight acreage represented 5.8 per cent of the total, but the gross loss was lower.

Other Loss

The losses from physical factors such as an excessive amount of weeds in a field, root rot, and variance in the water table are included collectively in the *other* loss category.

The photographic interpretation showed that only two fields had an excessive amount of weeds and, in both cases, the percentage of reflection or vigor of the plants was considerably below the average of that for all fields in the study. Also, the yields were much lower than the average yields of the soil categories in which these fields were situated.

Other loss accounted for 32.6 per cent of the total loss for the 25 fields studied.

It was found that 95.8 per cent of the total other loss was in the fields with from 40 to 80 per cent of the imperfectly-drained clay loam soil. This situation is understandable because these fields had flooding and high water table levels, which are conducive to root rot as well as to other detrimental effects.

The average other loss per acre of beans was \$6.75 but, in some cases, ranged as high as \$26 an acre.

TOTAL LOSS FOR THE COUNTY

In 1968, there were 90,000 acres of white beans in Ontario, including 29,800 acres in Huron County (9).

The geomorphology of the white bean environment of Hensall may be different from that of Huron County generally. However, the loss exponents were furthered to include the production in Huron County. This was done by assuming that the soil for growing beans in the county had qualities similar to the soils of the study area and that the relative amounts of imperfectly-drained and poorly-drained soils within a field, were similar throughout the county.

The area studied represents only about two per cent of the total acreage of white bean production in Huron County.

The total loss for Huron County was estimated to be just over \$479,000. This represented less than 14 per cent of the gross income from white beans in the county in 1968. The loss because of blight in the county was just over \$293,000, about 8.5 per cent of the gross income from white beans.

SUMMARY

With the use of color infrared aerial photographs, taken in 1968, more than 540 acres of white beans, representing 25 fields in the Hensall area of Ontario, were interpreted to measure the extent of blight (1). The data were analyzed to estimate the types of loss, including that caused by blight, to the producer.

The total loss per acre including blight loss was \$20.65. The average loss because of blight was just over \$9.80 an acre or almost half of the total loss.

No data in this study deal with the actual amount of fertilizer which may have been applied by the producers. Consequently, no appraisal is possible in relation to the percentage of reflection from the foliage. However, it would be difficult to dissociate the highest average percentage of reflection from the complementing top average yields, indicating that further study may be warranted in color infrared aerial photographic analysis involving reflection of chlorophyll and fertilizer relationships. Also, the photographic data show that there are excellent samples within the study area where further economic analysis of management practices may be done, not only for white beans, but, also for crops such as corn, winter wheat and vegetables.

NOTES AND REFERENCES

- (1) Philpotts, L.E. and V.R. Wallen, "IR Color for Crop Disease Identification", *Photogrammetric Engineering*, November 1969, pp. 1116 to 1125.
- (2) A MacBeth RD 100 Reflection Densitometer was used to measure the percentage of reflection at numerous uniformly spaced positions across a bean field. Generally, the data indicate a comparative real-time vigor of the plants.
- (3) The scanner has the capability of detecting 62,500 bits per square inch. At the aerial photographic scale used, the spatial resolution of the scanner is equivalent to about one square foot on the ground. Consequently, with a known aerial photographic scale combined with the scanner system, the measurement of acreage is extremely accurate.
- (4) Wallen, V.R. and L.E. Philpotts, *Disease Assessment and Methodology from IR Color Aerial Photography*, paper submitted to the American Society of Photogrammetry, April 1970.
- (5) Hoffman, D.W., N.R. Richards, and F.F. Morwick, *Soil Survey of Huron County*, Report No. 13 of the Ontario Soil Survey, Experimental Farms Service, Canada Department of Agriculture and the Ontario Agricultural College, February 1952.

(6) The average price of \$8.30 a hundredweight of seed to the producer in 1968 was used in estimating the loss. This price was obtained in consultation with R. E. Wilson, Production and Marketing Branch, Canada Department of Agriculture.

(7) The formula used was:

$$[(Y_t - Y_a)AP] - [(Y_t - Y_n)VP] + [Y_t - (Ra/R_t)Y_tAP]$$

when:

A = the total arable acres of a field.

P = the price per pound of beans to the farmer.

Ra = the average percentage of reflection measured within a field.

Rt = the average percentage of reflection of the best producing fields within the pertinent group of fields with a certain percentage range of a soil type.

V = the total non-producing but arable acreage within a field.

Ya = the yield, in pounds per acre, of beans of the field.

Yn = the net yield, in pounds per acre, of beans found by $Y_t - (A - V)$.

Yt = the average yield, in pounds per acre, of beans of the top-producing fields within the pertinent group of fields with a certain percentage range of a soil type.

(8) Other loss may include the effect of weeds, other diseases such as root rot, and the effect of variance in the water table.

(9) Farm Economics, Co-operatives and Statistics Branch, Ontario Department of Agriculture and Food.

POLICY AND PROGRAM DEVELOPMENTS

Nova Scotia Grain Marketing—The federal government has entered into agreements, under the Agricultural Products Co-operative Marketing Act, with Malagash Grain Limited of Nova Scotia to market wheat, oats and barley produced in Nova Scotia in 1970.

Under this act, the grain must be marketed on a co-operative plan; that is, an initial price, set by the agreement, is paid to producers on the delivery of their grain and the grain is then pooled, graded and sold. Any returns, above the storage and handling charges, are distributed to the producers. The federal government agrees to make up any difference between the average wholesale price, plus the storage and handling costs, and the initial price paid to the producers. The maximum storage and handling costs are also specified in the agreement.

The grades of grain to be marketed under these agreements are: No. 4 and No. 5 Canada Eastern Red Spring wheat; No. 4, No. 5 and No. 6 Canada Eastern barley; and No. 4 and No. 5 Canada Eastern oats. (July 29, 1970)

Ontario Bean Producers' Co-operative Marketing Order—An agreement under the Agricultural Products Co-operative Marketing Act has been made between the Ontario Bean Producers' Marketing Board and the federal government for the marketing of No. 1 Canada Eastern pea beans and yellow-eyed beans produced in 1970. The initial payment for both types of beans was set at \$5.76 a hundredweight. The

storage costs may not exceed 35 cents a hundredweight, and the handling costs may not exceed \$1.25 a hundredweight for pea beans and \$2.00 a hundredweight for yellow-eyed beans. (August 5, 1970)

Hog Premiums—Federal government hog quality premiums will not be paid after December 31, 1970. The phasing-out of the premiums was started in January 1969 when the new hog grading system came into effect. The new grading system offers higher returns to producers who market high quality hogs; therefore, the premium is no longer needed as an incentive. (August 7, 1970)

Nova Scotia Hog Marketing Order—The authority of the Nova Scotia Hog Producers' Marketing Board to continue to collect levies of five cents per hog marketed has been extended to September 1, 1971. (August 28, 1970)

Lamb Premiums—The federal government premium for Choice grade lambs will be discontinued on December 31, 1970. The lamb premium program was introduced in 1961 to encourage farmers to produce the type of lambs consumers prefer. However, changes in market conditions since then have decreased the effectiveness of the premium as an incentive. Lamb prices are now higher, and more lambs are marketed through channels where the premium does not apply. The premium is now one dollar for a Choice grade carcass, weighing from 36 to 56 pounds. (September 3, 1970)

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Provincial Agricultural Legislation in the Atlantic Provinces, 1970, Economics Branch, Canada Department of Agriculture, Ottawa, June 1970, Pub. No. 70/7. pp. x + 104.

This reference bulletin outlines the laws relating to agriculture of the four Atlantic Provinces.

Co-operation in Canada, 1968, 37th Annual Summary, J. M. Sullivan, Economics Branch, Canada Department of Agriculture, Ottawa, June 1970, Pub. No. 70/8. pp. 24.

This is a report on the activities of five types of co-operatives in Canada: marketing and purchasing, production, fishermen's, service and wholesale co-operatives. Data were collected in a survey made by the Economics Branch.

OTHER PUBLICATIONS

Not Available from the Economics Branch

The Agriculture of the Atlantic Provinces, J. F. Booth, G. C. Retson and V. A. Heighton, Department of Regional Economic Expansion, Ottawa 1970. pp. iv + 187.

This report contains the results of a joint study in 1967 by the Economics Branch, Canada Department of Agriculture and the Atlantic Development Board, dealing with all aspects of agriculture in the Atlantic Provinces. Recommendations were made for changes to improve the agriculture in this region.

Agricultural Science in Canada, 1970, B. N. Smallman, D. A. Chant, D. M. Connor, J. C. Gilson, A. E. Hannah, D. N. Huntley, E. Mercier and M. Shaw, Special Study Number 10, Science Council of Canada, Queen's Printer, Ottawa, 1970, Cat. No. SS21-1/10. pp. 148. Price: \$2.

In this report, the study group presents its observations and conclusions on the current state of research and development in Canadian agriculture and makes some recommendations for change.

One important conclusion of the study group was that agricultural research and development in Canada lacks adequate co-ordination and integration at the different levels within the agricultural industry. The study group also found that research in agricultural economics makes up too small a part of agricultural research.

The Fertilizer Industry in Ontario, a Report for the Special Committee on Farm Income in Ontario, by the Farm Economics, Co-operatives and Statistics Branch, Ontario Department of Agriculture and

Food, Toronto, July 1970, Pub. No. 70-15-15C. pp. vi + 102.

This study was undertaken to examine developments in the organization, distribution and efficiency of the marketing system for fertilizers, and to analyze the industry's competitive characteristics and pricing practices. The study is not intended to be a comprehensive investigation of the Ontario fertilizer industry. The report states that Ontario's fertilizer industry is in a period of transition in its organizational structure and distribution system and a final assessment can be made only when the emerging system has stabilized.

Canadian Growth Revisited, 1950-1967, Dorothy Walters, Economic Council of Canada, Queen's Printer, Ottawa, August 1970, Cat. No. EC22-1/28. pp. 70. Price: \$1.50.

This analysis measures the contributions of inputs (employment, education and capital investment) and productivity to the growth of output—both total and per worker. Projections of growth rates from 1970 to 1980 are included.

Interregional Competition in Canadian Grain Production, W. J. Craddock, Economic Council of Canada, Queen's Printer, Ottawa, August 1970, Cat. No. EC22-2/12. pp. 270. Price: \$3.

This study examines the regional production patterns of cereal crops in Canada. The author analyzes economic efficiency in cereal crop production, and attempts to identify the regions which could meet domestic and export demands for food and feed grains at the lowest costs.

Simulation in Agricultural Economics Research, G. R. Winter, Department of Agricultural Economics, University of British Columbia, Vancouver, September 1970. pp. 17.

Characteristics and Consequences of Rural Poverty, G. R. Winter, Department of Agricultural Economics, University of British Columbia, Vancouver, September 1970. pp. 17.

Capital and the Growth of Farm Revenue in Canada, G. R. Winter and M. J. Hladik, Department of Agricultural Economics, University of British Columbia, Vancouver, September 1970. pp. 34.

These are reports of speeches made at various conferences in 1967 and 1968.

World Demand Prospects for Wheat in 1980, with Emphasis on Trade by the Less Developed Countries, Foreign Agricultural Economic Report No. 62,

Economic Research Service, United States Department of Agriculture, Washington, D.C., July 1970. pp. 170. Copies of this report are available from the Division of Information, Office of Management Services, U.S. Department of Agriculture, Washington, D.C. 20250.

This report is one of a series publishing results of the research projects on demand prospects for selected agricultural commodities. In this publication are included an historical analysis of world wheat

trade, and projections of wheat production, availability, trade, and export earnings.

Farm Business Summary, 1969, Extension Report No. 18, Farm Management Division, Economics and Statistics Branch, Saskatchewan Department of Agriculture, Regina, July 1970, pp. 35.

This report presents a summary and analysis of the data collected from the 117 farm businesses participating in the Farm Accounting Analysis Service in 1969.

NOTES

Influencing Markets and Trade—A Look at Another Department—The consumer's needs for goods and services are the basis of the economy. Ideally, there should be a free market system with just and fair economic treatment for each citizen whether he makes a contribution to the *supply* or the *demand* side of the market place. The Department of Consumer and Corporate Affairs was established in 1967 to assist and encourage such fair treatment for all consumers.

In an official release from the department, its duties, powers and functions are outlined as follows:

- a) consumer affairs;
- b) corporations and corporate securities;
- c) combines, mergers, monopolies and restraint of trade;
- d) bankruptcy and insolvency; and
- e) patents, copyrights and trade marks.

The Minister of Consumer and Corporate Affairs also performs the duties of the Registrar General of Canada. This includes registering all instruments of summons, proclamations, commissions, letters patent, letters patent of land, writs and other instruments and documents issued under the Great Seal; and all bonds, warrants of extradition, warrants of removal of prisoners, leases, deeds of sale, surrenders and all other instruments requiring registration.

A Summary of the Results of the First Survey for the Agricultural Economics Research Information System (AERIS)—The first AERIS report was published in July 1970 (see: *Canadian Farm Economics*, Vol. 5, No. 3, August 1970, p. 28).

AERIS was established to provide information on the current status of agricultural economics research in Canada. The information contained in the first report was collected from a survey of 118 research agencies, of which only 30 submitted completed returns. Only the projects described in these replies are included in the AERIS report.

In the report, the 156 research projects listed were grouped into five categories. The largest number of projects (60) were in the economics of production and resource management. It was estimated that these 60 projects would require 68 man-years to complete. Forty-two projects requiring 73 man-years, were being carried out in the field of agricultural adjustment and the development of rural communities; 40 projects (60 man-years), in marketing research; 12 projects (32 man-years), in the economics of development and conservation of natural resources; and 2 projects (4 man-years), in a miscellaneous category.

Most of the current research in agricultural economics is being done by universities, with 60 per cent of the projects listed in AERIS. Public agencies (government departments and commissions, and research councils) were doing 47 per cent of the research listed. However, the 74 projects of the public agencies are estimated to require only 90 man-years; whereas, 145 man-years are expected to be needed to complete the 81 projects of the universities. Only one research project was reported from private agencies.

Researchers in Ontario are carrying out 75 of the 156 projects listed in AERIS. Manitoba is second with 35 projects.

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Canadian Farm Economics is published bi-monthly by the Economics Branch, Canada Department of Agriculture, Sir John Carling Building, Ottawa, and is based on material prepared by economists of the Economics Branch.

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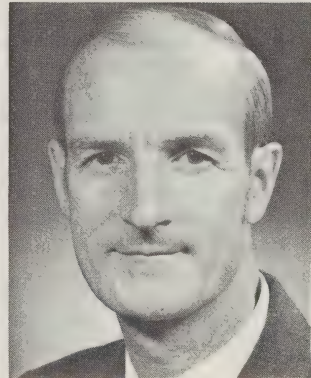
CANADIAN FARM ECONOMICS

THE AGRICULTURAL SITUATION IN CANADA¹



G. R. Purnell

*"...what is happening in
agriculture today?..."
"how are current economic
changes affecting
agriculture?..."
"...what are the problems
of agriculture..."
"... in what direction should
agricultural policy
move?..."
All these questions are
considered in this paper.*



V. A. Heighton

Canadian agriculture is one of the most important sectors of the economy. This statement has been used so many times it is no longer feasible to attribute it to any particular genius. The dynamic changes that have occurred in agriculture since World War II are results of a changing technology, and of economic, social and political events.

The purpose of this paper is to briefly outline the present situation, current trends and outlook for agriculture during the next decade. It attempts to deal with the basic problems that afflict agriculture and some of the goals that must be achieved to overcome them. As the steam locomotive has yielded to the modern oil-burning diesel, so the old pattern of agriculture has been substantially altered. Federal

government intervention in agriculture is greater today than a decade ago and is probably greater than in any other sector. The proposed national marketing boards to control the sale of certain agricultural products at the national level, the LIFT program designed to reduce wheat surplus inventory, and the various subsidies and quotas for some agricultural products are examples of how the government becomes involved in attempting to alleviate the distress in certain areas from time to time. Many persons in the agricultural sector and in other sectors find this intervention an encroachment upon their freedom. Quite often these fears develop through misunderstanding and underestimating the magnitude of the farm problem. Other persons, however, look to government for support in the competition with the ever-increasing domination of big business and big labor. The future direction the government may follow will almost certainly revolve around programs and policies designed to assist in farm adjustment.

¹ Text of speech given by Dr. Purnell at: a) the Ontario Institute of Agrologists, Special Policy Meeting, November 8, 1970 and b) the Canadian Farm Writers and Broadcasters Annual Meeting, November 15, 1970.

THE AGRICULTURAL SITUATION IN THE ECONOMY

The relative importance of agriculture in the economy continues to decline in terms of its share of total population, Gross National Product, employment and trade (Table 1). The Canadian population reached the 20 million mark in 1967, but the rural population represented only 28 per cent of the total, compared with 46 per cent in 1930. Agriculture's contribution to the GNP increased from \$628 million in 1930 to about \$2,500 million in 1967. However, agriculture's relative share of GNP decreased from 11 per cent in 1930 to about five per cent in 1967. Similarly, the agricultural labor force which made up about 33 per cent of the total labor force in 1931 decreased to 7.2 per cent of the total in 1968.

Agricultural exports and imports have increased in absolute values, but have decreased as a percentage of total exports and imports. Agricultural exports increased from \$692 million⁽¹⁾ in 1930 to \$1,483 million in 1967, but declined as a percentage of total exports, from 43 per cent to 13 per cent. During the same period, agricultural imports increased from \$403 million to \$1,083 million, but, in proportion to total imports, decreased from 22 per cent to about 10 per cent.

The Nature of the "Farm Problem"

The "farm problem" has been diagnosed as a combination of: 1) in the aggregate, low and un-

stable net incomes; 2) unequal distribution of income, among farmers and among regions; 3) an imbalance in resource use; and 4) an over-capacity of production, relative to the demand for agricultural products.

Low and unstable incomes of people in agriculture compared with incomes of those in other occupations—

In the period 1946-50, average farm incomes were about two-thirds of the average wages of production workers in manufacturing. This relationship declined steadily throughout the 1950's but has more recently shown some improvement. In 1966-67, average farm incomes were 77 per cent of the non-farm average (Table 2). Instability of income in agriculture results from fluctuations in production yields, in prices, in production costs and in marketing opportunities. One of the serious impacts of fluctuating income is the reduced ability to plan for efficient resource use.

Unequal distribution of income within agriculture—

Over one-third of all Canadian farms had a gross farm income of less than \$2,500 in 1966. On the other hand, 22 per cent had gross incomes exceeding \$10,000 that same year. On individual farms, the resource base may be too low or poor management may exist, thus resulting in low farm income. Regional disparities also exist in the distribution of farm income. Depending upon the physical resources and proximity to market, a region may be in a relatively low income position.

TABLE 1—AGRICULTURE IN THE CANADIAN ECONOMY, SELECTED YEARS 1930 TO 1967 AND PROJECTIONS TO 1980

	Units	1930	1940	1950	1960	1967	1980 ^a
Total Population.....	millions	10.4	11.5	14.0	18.2	20.0	26.0
Rural population as a percentage of total population ^b	per cent	46.3	43.5	38.4	30.0	28.0	19.0
Population living on farms as a percentage of total population ^b	per cent	31.7	27.4	20.8	11.7	9.8	6.0
Agriculture's contribution to GNP.....	million dollars ^c	628	693	1,716	1,745	2,479	4,792
Percentage of GNP.....	per cent	10.9	10.3	9.5	4.8	4.6	3.0
Agricultural labor force.....	thousands	1,238	1,344	1,018	683	559	386
Percentage of total labor force.....	per cent	33.6	32.2	20.7	11.3	7.6	4.0
Agricultural exports.....	million dollars ^d	692	780	938	1,147	1,483	2,000 ^e
Percentage of total exports.....	per cent	43.3	33.0	32.5	26.8	13.3	—
Agricultural imports.....	million dollars ^d	402	389	483	810	1,083	—
Percentage of total imports.....	per cent	22.1	20.0	16.8	17.1	9.8	—

^aProjections for 1980, except for population, are based on compound growth rates for 1962-67. Population living on farms is projected on 1961-66 rate of change. Rural population in 1980 is an estimate of the Economic Council of Canada, *Fifth Annual Review*, September 1968.

^bPopulation figures are for the census years, 1931, 1941, 1951, 1961, and 1966.

^cValues in current dollars.

^dValues at 1948 prices.

^eValues in 1957 dollars.

Source: *Outlook in Patterns and Practices in Agriculture in 1980*, G. R. Purnell, A. B. Andarawewa, and R. A. Stutt, Pub. No. 69/1, Economics Branch, Canada Department of Agriculture, January 1969.

TABLE 2—RELATIONSHIP OF AVERAGE FARM INCOME TO WAGES IN MANUFACTURING INDUSTRIES, CANADA, SELECTED PERIODS, 1946-50 TO 1966-67

Period	Average Realized Net Farm Income- From Farming Per Farm Family Worker ^b	Average Wages of Production Workers in Manufacturing	Average Farm Incomes as a Percentage of Average Manufacturing Wages
	1949 = 100		per cent
1946-50	83	91	67
1951-55	110	132	61
1956-60	119	161	54
1961-65	156	192	59
1966-67	237	226	77

^a Realized net farm income is the net return to farm operators and their family help for their labor and management, and interest on equity. It excludes income from off-farm work.

^b Farm family workers include farm operators and unpaid family help.

Sources: *Man Hours and Hourly Earnings*, Cat. No. 72-003, Monthly; *Farm Net Income*, Cat. No. 21-202, Annual; *The Labour Force*, Cat. No. 71-001, Monthly, Table 6, Dominion Bureau of Statistics.

An imbalance of resources—Individual farm firms are rapidly substituting capital and new technology for land and labor. As a rule, increased productivity results, but the nature of the market for agricultural products, coupled with increased production, tends to depress farm product prices.

An increase in the supply for farm commodities relative to the demand for them does not, in itself, mean that agriculture is doomed forever to a state of over-production and depressed prices. If the resources used in agriculture were relatively mobile,

decreasing returns from one type of resource use would be the signal to cause inputs to be shifted to other more profitable uses. Theoretically, then, if resources were perfectly mobile, an hour of labor in farming would earn the same as it would in any other industry, subject to the conditions of perfect competition, such as free entry and exit. But this is not the situation and hence, we have what is known as "trapped" resources: resources which have limited or no alternative uses. This situation applies to much of the land and building resources in farming but also to part of the labor resources, especially older farm operators or unskilled farm workers. This explains, in part, the slow response of farm labor to widening disparities between farm and non-farm incomes.

The adjustment to new types of resource use has a considerable lag, partly because of the "generation system" of farm ownership and management. Education is a necessary condition to provide farmers with the management base and the broad perspective necessary for the adoption and efficient utilization of new technology (2). Since economic forces operating through market prices are evidently insufficient, in themselves, to bring about the necessary changes, other solutions to the adjustment problem must be sought. Good farm management practice is the dynamic force that propels a farmer to readily adapt to the changing environment and remain competitive in the complex agricultural industry.

TABLE 3—INDEX NUMBERS OF THE PHYSICAL VOLUME OF AGRICULTURAL PRODUCTION, BY SELECTED COMMODITIES, CANADA, 1948-52 TO 1967

Period and Year	Grains and Oilseeds ^a	Livestock	Poultry Meat	Dairy Products	Fruits	Vegetables	All Commodities
	1949 = 100						
Average 1948-52 ^b	163.0	98.0	98.2	98.4	97.0	102.4	115.5
Average 1953-57 ^b	160.5	104.5	155.9	109.2	93.0	91.1	123.0
Average 1958-62 ^b	137.0	122.0	277.3	115.9	93.2	93.5	130.6
1963	237.1	127.3	270.2	117.8	104.0	99.9	162.1
1964	176.7	136.5	297.6	118.8	113.6	104.7	151.2
1965	213.9	136.7	327.3	118.8	98.9	111.6	162.1
1966	267.7	143.8	363.5	119.6	107.7	109.1	182.3
1967	177.7	149.7	358.8	119.5	123.4	111.3	159.6
Average 1963-67 ^b	214.6	138.8	323.5	118.9	109.5	107.3	163.5
Percentage Changes	per cent						
1948-52 to 1963-67	+31.6	+41.6	+229.4	+20.8	+12.9	+ 4.8	+41.6
1958-62 to 1963-67	+56.6	+13.8	+42.3	+ 2.6	+17.5	+14.8	+25.2

^aIncludes wheat, oats, barley, shelled corn and flaxseed.

^bFigures given are five-year averages of annual indexes.

Source: Farm Finance Section, Agriculture Division, Dominion Bureau of Statistics.

Over-capacity of production—The problem of over-capacity usually has a depressing effect on farm prices. The most simplified explanation of this phenomenon is one of supply and demand. When production exceeds the market demand, one would expect a decline in prices. Output of all commodities in 1963-67 was 42 per cent higher than in 1948-52 (Table 3). During the same years, prices of farm products increased by six per cent. At the same time, prices of goods and services purchased by farmers for use in farm production rose by 51 per cent. This represents what is known as the "cost-price squeeze" in farming (3) (Table 4, Figure 1).

It is not sufficient, however, to consider how much farmers produce and what they get for it as symptomatic of the farm problem. Basically, the problem stems from the many technological changes which have made it increasingly profitable for many farmers to substitute capital inputs for labor. As these substitutions have taken place, the basic farm input mix and the amount of knowledge needed in farming has changed. The new inputs, such as larger tractors, are capable of producing a greater output per unit of input, hence fewer units of the new inputs are needed. This also means fewer farms and fewer farmers are needed.

TABLE 4—THE "COST-PRICE SQUEEZE" IN CANADIAN AGRICULTURE, 1946 TO 1968

Year	Prices Paid By Farmers	Prices Received By Farmers	Prices Received as a Percentage of Prices Paid
	1935-39 = 100		per cent
1946.....	157.0	204.1	130
1947.....	170.4	215.8	127
1948.....	197.6	255.8	129
1949.....	204.1	255.4	125
1950.....	210.4	260.8	124
1951.....	230.0	296.8	129
1952.....	243.1	274.4	113
1953.....	239.8	250.4	104
1954.....	237.2	236.8	100
1955.....	238.3	232.7	98
1956.....	247.6	234.6	95
1957.....	255.9	234.2	92
1958.....	259.9	245.5	94
1959.....	269.5	247.4	92
1960.....	276.7	250.0	90
1961.....	282.2	261.2	93
1962.....	290.7	272.0	94
1963.....	298.6	268.4	90
1964.....	308.6	265.8	86
1965.....	321.8	282.2	88
1966.....	343.2	307.0	89
1967.....	365.3	305.2	84
1968.....	387.3	299.1	77

Sources: *Price Index Numbers of Commodities and Services Used by Farmers*, Cat. No. 62-004, and *Index Numbers of Farm Prices of Agricultural Products*, Cat. No. 62-003, Monthly, Dominion Bureau of Statistics

SELECTED AGRICULTURAL INDEXES, PRICES OF FARM PRODUCTS, MACHINERY PRICES, FARM WAGES AND PRICES OF COMMODITIES USED BY FARMERS, CANADA 1950 TO 1967

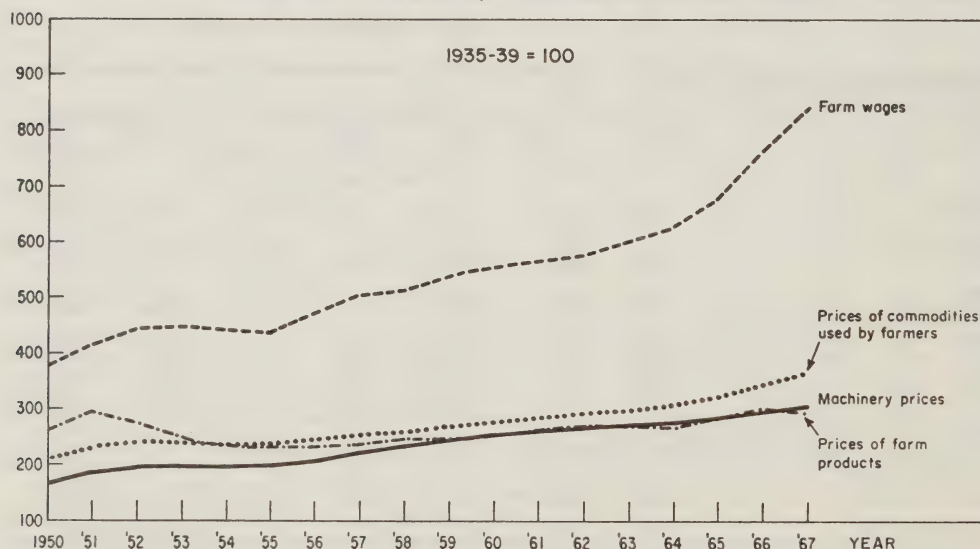


FIGURE 1

The Role of Economic Development

Economic development of an economy may be said to reflect changes in the relative size of the farm and nonfarm sectors and to be characterized by interaction between these two sectors (4). In the early stages of development of an economy, the fortunes of the nonfarm sector are largely tied to the farm economy. This was generally the situation in Canada before World War II. As the economy develops, labor is freed from agriculture for non-farm production and capital accumulation. With more capital in the economy, the productivity of labor is increased and the real income of labor rises. This, in turn, results in a rise in the cost of labor relative to capital which encourages the substitution of capital for labor. As development proceeds, farming has to compete more and more with the demands for capital and labor outside of agriculture. The pressures to substitute capital for labor within farming thus tend to arise from the nonfarm sector as development proceeds. This illustrates the interaction between the farm and nonfarm sectors of the economy. Instead of the nonfarm sectors being dependent on the farm sector, the farm sector becomes dependent upon the nonfarm sector.

The Effect of New Technology

Public investments in agricultural colleges and departments of agriculture since the early part of the century have provided an input to agriculture in the form of research and knowledge. This knowledge could have been supplied by private industry but it would probably have been at a much slower rate. Today, however, much more new knowledge is being provided to agriculture from private business. This particularly applies in integrated or contractual enterprises.

Technological changes in livestock and crop production have been tremendous since the 1940's. The amount of feed needed to produce 100 pounds of pork was reduced by more than half between 1910 and 1960 (4). Another reduction by one-third is expected to be possible by 1980. In crop production, new technology has helped to develop improved varieties and seeds, better insecticides and pesticides, new cropping practices, etc. These and other sources of improvement have altered the makeup of agriculture and contributed to increased productivity.

THE FUTURE FOR FARMING

Where is the agriculture industry going? What will be its structure by 1980? To answer these questions, many factors must be considered, such as:

- 1) What will be the future level of demand for farm commodities, both domestic and export?

- 2) What will be the rate of change in demand for farm inputs?
- 3) What effect will changes in market requirements have on the structural organization and the institutions of agriculture?
- 4) What government policies should be pursued in order to satisfy the goals of society and of farmers themselves?

One way to determine what future conditions are likely to be is simply to project recent trends. This approach can be characterized as "what is likely to be". This is generally a valid method as long as it can be assumed that the economic forces influencing these present trends will continue to do so in the future in much the same way. Also, it is necessary to assume that there will be no drastic changes in government policies or programs. Another difficulty encountered in projecting recent trends is determining when a significant turning point or leveling off in a trend may occur.

A second approach in estimating the future of agriculture, with respect to the amounts of farm products needed is to determine the inputs needed to meet the expected demand for these products, based on current input/output ratios, projected population, real incomes and per capita food consumption. Such an approach could be characterized as "what needs to be".

A third approach is to estimate the most efficient level of output (and the most efficient combination of inputs, based on current knowledge, for producing the output) that could be sold at prices that would provide returns to farm resources equal to the returns from their best alternative uses. This approach can be described as one of "what optimally ought to be", given a set of goals and values (4).

In this paper, future patterns and practices are assumed to be conditioned by their past trends, (the "what is likely to be" approach). As was noted earlier, this assumes that the economic forces governing past trends have been accurately identified and that these forces will continue to operate in the future in much the same way. However, changes in technology, (which are increasing in scope and occurring at a faster rate than in the past), changes in government policies and programs, and changes in the international situation will lead to an alteration in these relationships and hence in the predicted growth rates. These kinds of changes are difficult to quantify and are, in themselves, part of the growth process. Furthermore, the farther the projected period or target date lies in the future, the greater will be the rate of change in the variables used. Therefore, there will be less confidence placed on the reliability of the projections.

Changes in Demand (5)

Domestic Demand—The most important determinants of demand are total population and disposable consumer income. Canada's population is expected to reach 26 million by 1980, a projected annual growth rate of 1.9 per cent (Figure 2). This is somewhat less than the 2.4 per cent growth rate experienced during the past 15 years. Eight out of 10 persons will live in urban areas in 1980 (Table 1). In 1966, 72 per cent of the population were located in urban areas. The percentage of the total population living on farms is estimated to decrease from about 10 per cent in 1966 to six per cent in 1980. Gross National Product, in real terms, is expected to be more than twice as much as the 1964-66 average figure by 1980, and personal disposable income is forecast to represent almost 70 per cent of this (Table 5). Per capita disposable income in 1980 is expected to have increased by 40 per cent from the 1964-66 average.

Consumer expenditure on food as a proportion of disposable income is expected to continue its long-run downward trend from the 1964-66 level of about 20 per cent to 18 per cent in 1980. Per capita food consumption in 1980 is expected to be about the same as in 1964-66, in terms of total weight, but the composition will be considerably different. Historically, rising consumer incomes have been associated with declining per capita demand for foods such as cereal products and potatoes, and with rising demand for meat, fruits and vegetables. Consumption of fats and oils of vegetable origin is also expected to continue to rise. Consumer expenditure, in dollar terms, for foods is expected to rise, but most of this will be accounted for by increased service content (convenience packaging) rather than by any increase in quantity of products of farm origin. Figures 3 and 4 show the trends in per capita consumption of foods of animal and crop origin.

An increased demand for meat will contribute to an increased demand for farm products in the form

POPULATION AND LABOR FORCE, CANADA 1947 TO 1967, AND PROJECTIONS TO 1980

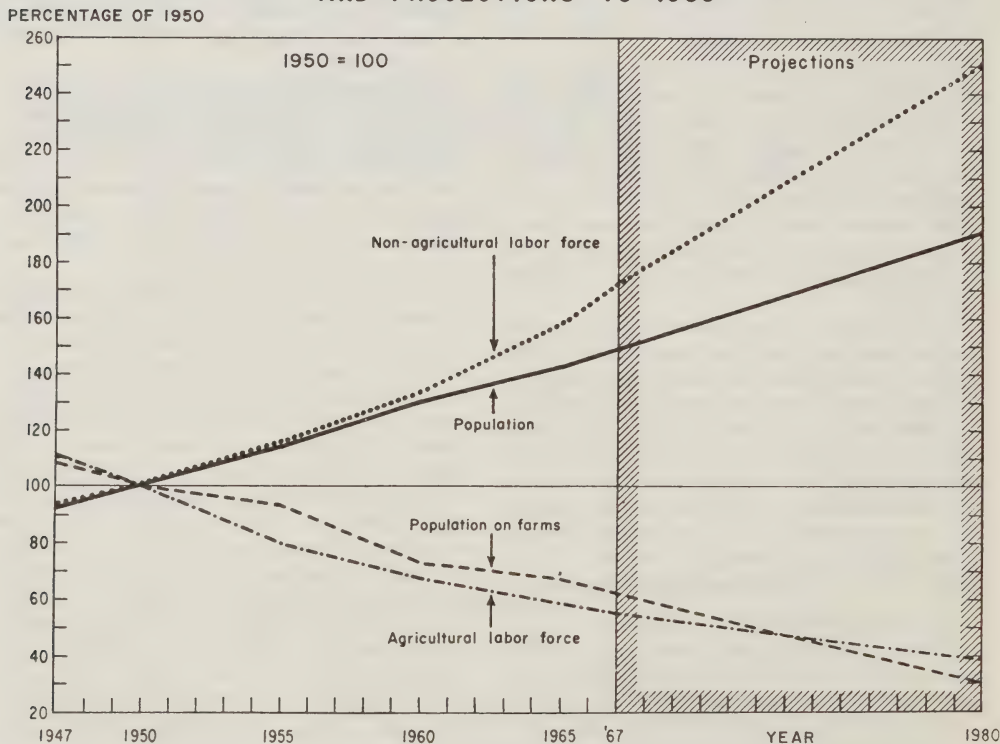


FIGURE 2

TABLE 5—POPULATION, GROSS NATIONAL PRODUCT, INCOME, AND EXPENDITURE, CANADA, SELECTED PERIODS, 1949 TO 1966, AND PROJECTIONS TO 1980

	1949-51	1959-61	1964-66	1980	1980 as a percentage of 1964-66
	thousands				per cent
Population at June 1.....	13,722.6	17,863.6	19,649.6	26,050	132.6
	billion dollars ^a				
Total					
Gross National Product.....	23.1	34.2	44.6	90.3	202.1
Disposable income.....	15.4	23.8	39.0	62.9	203.8
Expenditure on goods and services.....	14.3	22.4	28.4	57.8	203.5
Expenditure on food.....	37.5	5.5	6.2	11.3	182.5
	dollars ^a				
Per capita					
Gross National Product.....	1,682	1,916	2,273	3,466	152.5
Disposable income.....	1,126	1,333	1,569	2,415	153.9
Expenditure on goods and services.....	1,042	1,254	1,445	2,219	153.6
Expenditure on food.....	260	307	316	434	137.3
	per cent				
Food expenditure as a percentage of disposable income.....	23.1	23	20	18	

^a1957 constant dollars.

Source: *Demand-Supply Projections for Canadian Agriculture—1980*, Economics Branch, Canada Department of Agriculture, Ottawa, June 1968.

of animal feeds. On the basis of two assumptions respecting grain conversion ratios (5), feed requirements are expected to increase by 23 to 37 per cent. Small increases are predicted in the amount of grains and oilseeds needed for seed and industrial uses.

Export Demand—The preceding demand projections relate only to conditions in the domestic market. To all the uncertainties of this market, there are additional ones in the export market. Factors that must be considered are: tariffs, quantitative restrictions, and bilateral arrangements; changes in incomes, population, tastes and preferences in importing countries; government policies; and comparative costs. Canadian farm exports go basically to three types of markets: developed countries, developing countries and centrally-planned countries. Each of these exhibit different economic characteristics. The developed countries, which include Japan, have been Canada's most important outlets on a historical basis, but Western European countries are relatively less important markets today than before World War II. Canada has no large commercial export outlets in the developing countries.

Any attempt to project export demand for farm products, either short-term or long-term, is so hedged with uncertainties as to be very indefinite. However, if the continuation of the trends and relationships characteristic of the postwar period is assumed, then some sort of a projection can be made. Such a projection does not take into consideration dramatic

changes in production, processing, storage and transportation technology—areas in which there have been notable changes recently. Also changes in government policies, wars, etc. are not taken into account. However, under two assumptions respecting the level of wheat exports (5), total agricultural exports are predicted to increase by 18 to 35 per cent by 1980. The first projection represents a growth rate in exports of one per cent a year and is based on an assumption that wheat exports are not expected to increase from the 1964-66 average of 500 million bushels. The second projection is based on a continuation of past export trends, including the past trend in wheat exports.

Changes in Supply (5)

The supply response of Canadian farmers will be conditioned by the levels of domestic and export demand, by changes in prices and price relationships and technology. Under the conditions of extreme uncertainty in export markets and the impact of rapidly changing technology, it is very difficult to make supply projections. However, on the basis of the continuation of "normal" trend, avoiding extremes caused by weather or unusual short-term demand, some tentative forecasts can be made.

The outlook for wheat production is very uncertain. On the basis of normal trends in yields and acreage, wheat production could reach 850 to 900 million bushels by 1980. This would only be 23 to 73 million bushels more than the 1966-67 bumper

INDEX OF PER CAPITA FOOD CONSUMPTION, FOOD GROUPS OF ANIMAL ORIGIN,^a CANADA 1949 TO 1966

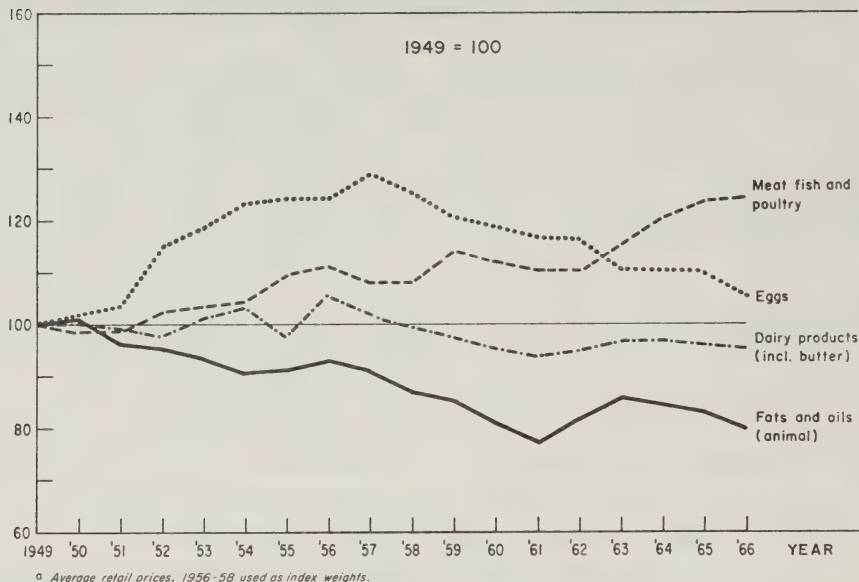


FIGURE 3

INDEX OF PER CAPITA FOOD CONSUMPTION, FOOD GROUPS OF CROP ORIGIN,^a CANADA 1949 TO 1966

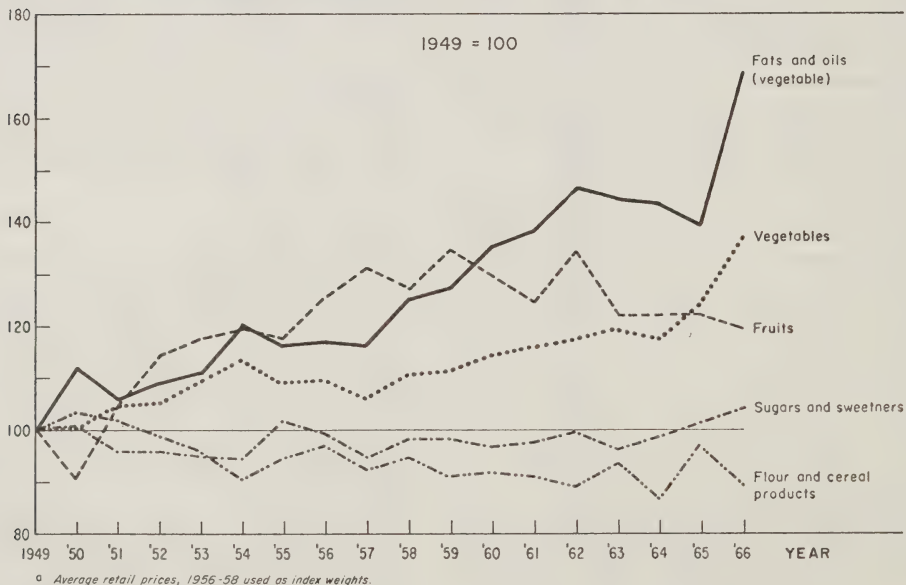


FIGURE 4

crop, but wheat production at this level would exceed the predicted domestic and export requirements. Production of coarse grains in 1980 could increase by one billion bushels or by 34 per cent from 1967. Part of this projected increase is contingent upon the increased domestic demand predicted for meats.

Projections of 1980 beef and veal production show a significant increase from 1967, sufficient to meet the increased domestic requirements. The supply of pork is also estimated to balance with domestic demand. By 1980, with the continuation of present trends, production of mutton and lamb is expected to provide only about 10 per cent of domestic requirements. Poultry meat and egg projections indicate that production by 1980 could be somewhat greater than projected domestic requirements, assuming current growth rates. Milk production by 1980 will likely be sufficient to meet domestic requirements. These projections indicate that product diversification in Canadian agriculture would be desirable. Such diversification, that is, more livestock and less wheat, is supported by recent Food and Agriculture organization and Organization for Economic Co-operation and Development projections which point to future world surpluses of grains and shortages of red meats.

Changes in Inputs (6)

Economic growth, changes in technology, changes in relative prices, specialization and demand for farm products are the most important variables affecting the demand for and nature of the farm input mix, farm inputs being a derived demand. As was noted earlier in this paper, a rise in the price of labor relative to capital leads to a substitution of capital for labor. Furthermore, a greater specialization in farm production leads to an increasing proportion of inputs being purchased from the nonfarm sectors.

On the basis of trends established in the postwar years, it is estimated that, by 1980, farm labor may constitute only about 15 per cent of total inputs compared with about 24 per cent in 1966 (Table 6). Real estate inputs (especially the improved land and buildings portion) as a proportion of total inputs are expected to continue a slow upward trend and reach 24 per cent by 1980. There is not expected to be any significant change in the total acreage in farms, but it may show some decline. Machinery and associated inputs may reach 25 per cent by 1980; fertilizer, 5 per cent; purchased feed and seed, 18 per cent; and all other inputs, 13 per cent. When projections are made in terms of general categories, such as those used in forecasting the input patterns, rather than in terms of individual items, greater degree of confidence can be placed in such projections. However, these projections were made on the basis of the given assumptions, and changes from past trends would change the expected patterns. For example, significant changes in general economic conditions could slow the rate of adjustment in the farm labor component, as happened in 1967-68 when the long-run decline was halted, especially, in the unpaid family labor force.

Changes in Farm Size and Organization

The term "size of farm" as used in this article, is determined by factors other than acreage alone. These include the volume of other inputs used, such as fertilizers and irrigation; the type of farm (for example, grain or dairy farm); and volume of sales. In 1966, there were 430,500 census farms of all types and sizes: their average size was 404 acres (Table 7). Projecting on the basis of the change in numbers from 1961 to 1966, there would be about 290,000 census farms in 1980, averaging about 600 acres in size. This assumes that the total acreage in farms will remain constant.

TABLE 6—DISTRIBUTION OF INPUT USE BY CATEGORIES IN CANADIAN AGRICULTURE, SELECTED YEARS 1941 TO 1966, AND PROJECTIONS TO 1980 (1949 DOLLARS)

	1941	1951	1961	1966	1980 ^a	Annual Rates of Change from 1947 to 1967
	per cent of total inputs					
Land and buildings.....	22	20	23	23	24	.39
Labor.....	57	45	33	24	15	-1.5
Machinery and equipment.....	11	18	20	22	25	.83
Purchased feed and seed.....	6	9	13	17	18	1.2
Fertilizer and limestone.....	—	1	2	4	5	2.4
Other inputs ^b	4	7	9	10	13	1.6
Total.....	100	100	100	100	100	

^aProjections for 1980 based on linear trends from 1947 to 1967.

^bOther inputs include livestock expenses, pesticides, insurance, irrigation, custom work, electricity and other miscellaneous items.

Source: Unpublished data, Economics Branch, Canada Department of Agriculture.

TABLE 7—AVERAGE SIZE OF FARMS, CANADA, SELECTED YEARS TO 1966, AND PROJECTIONS TO 1980

	1941	1951	1961	1966	1980 ^a
Acres per farm					
All farms.....	237	279	359	404	560
Commercial farms.....	—	353	487	512	600
Small-scale farms.....	—	214	209	171	100
Percentage of all Farms					
Less than 50 acres.....	15	14	11	12	—
Less than 100 acres.....	37	34	27	26	—
More than 300 acres.....	37	22	34	42	—
More than 640 acres.....	7	10	15	18	—

^a Based on annual rates of change from 1961 to 1966: all farms, 2.4 per cent; commercial farms, 1 per cent; small-scale farms, —3.9 per cent.

Source: *Census of Canada, Agriculture*, 1951, 1961 and 1966, Dominion Bureau of Statistics.

The proportion of farms in the various economic size classes (economic size, as used in this paper, is based on the average annual sales of farm products) is also expected to change by 1980. In 1966, only 22 per cent of all farms in Canada had average sales of \$10,000 a year but these 95,000 farms accounted for 65 per cent of the total farm product sales in that year (Table 8). There is not expected to be a reduction in the number of farms in this economic size class by 1980: an increase is more likely. (Figure 5

shows past trends and projections to 1980 in the number of farms in each economic size group).

Contractual arrangements and integration have become widespread in some aspects of farm production, particularly in poultry, meat, eggs, fruits, and vegetables for processing. Developments have taken place in the integration of hog and cattle finishing. Expansion in integration in the future will be determined by the relative importance of the economic and technical conditions that favor such developments such as the stabilization of supply, perishability of product, specialized capital equipment, risk and cost relationships.

The tax environment, as determined by government policy, can have also considerable influence on the institutional organization of agriculture. Many large farms in the past did not see the need for incorporation because the benefits did not outweigh the cost attached. However, changes in policies with respect to estate taxes, for example, could result in a more widespread adoption of the corporate structure in agriculture. A corporate setup in farming could also encourage an increased, specialized management input. Even for those farms retaining the individual proprietorship form of business structure, the management input, through the use of specialized consulting services, seems likely to in-

TABLE 8—NUMBER OF FARMS BY ECONOMIC CLASS, CANADA, SELECTED YEARS 1951, TO 1966, AND PROJECTIONS TO 1980

Average Annual Sales	1951			1961			1966			1980 ^a	
	Number	Per-centage of all Farms	Per-centage of all Sales	Number	Per-centage of all Farms	Per-centage of all Sales	Number	Per-centage of all Farms	Per-centage of all Sales	Number	Per-centage of all Farms
Commercial Farms ^b	235,090	38	78	259,037	54	90	276,835	64	95	252,248	80
\$10,000 and more.....	21,243	4	22	49,841	10	45	95,032	22	65	189,186	60
\$5,000 to \$9,999.....	69,019	11	27	90,419	19	27	96,856	22	21	47,296	15
\$2,500 to \$4,999.....	144,828	23	29	118,777	25	18	84,947	20	9	15,765	5
Small-Scale Farms ^c	387,309	62	22	221,052	46	10	152,910	36	5	63,062	20
All Farms ^d	623,091	100	100	480,903	100	100	430,522	100	100	315,310	100
Part-Time Farms.....	65,135	10.4	—	37,645	7.8	1.0	129,565	30	18	—	—

^a Projection for 1980 of the number of all farms is based on annual rate of change of 2.6 per cent during 1951-66. The number in each class based on the assumed arbitrary proportions of farms in each class to total.

^b Farms with annual sales of \$2,500 and more.

^c Farms with annual sales of less than \$2,500.

^d Includes institutional farms.

^e In 1951 and 1961, part-time farmers were defined as those with sales of agricultural products between \$250 and \$1,199 and (i) where the operator reported 100 or more days of off-farm work or (ii) where the operator reported farm income was less than his income from all other sources. In 1966, the definition was changed to those who received \$750 or more from off-farm work during the previous year or to those who received less than \$750 from off-farm work but worked 75 days or more off the farm.

Source: *Census of Canada, Agriculture*, 1951, 1961, and 1966, Dominion Bureau of Statistics.

NUMBER OF FARMS (HUNDRED THOUSANDS)

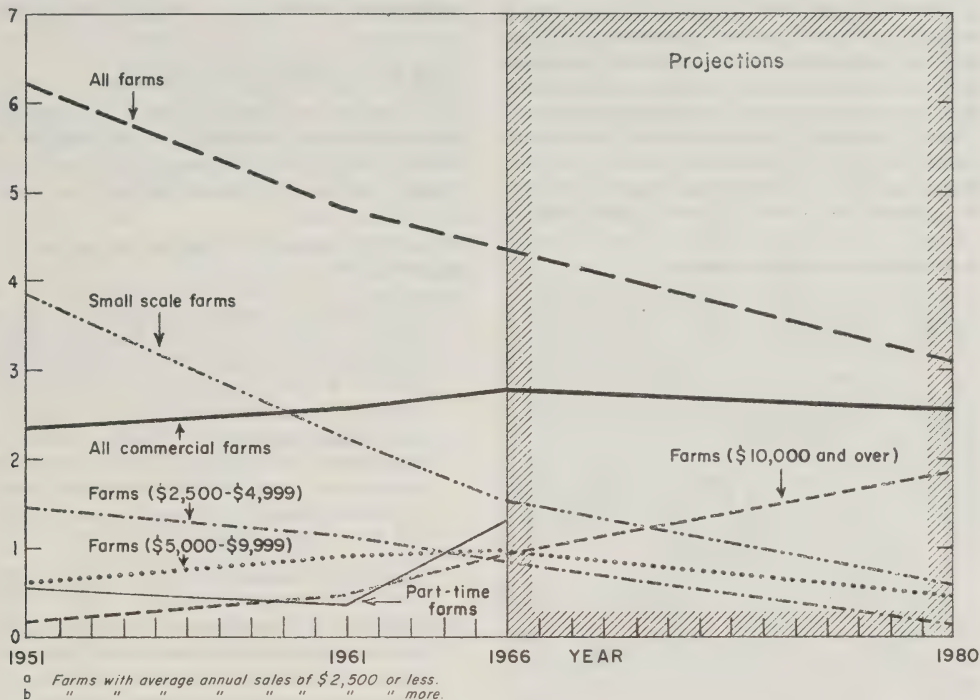


FIGURE 5

An appropriate conclusion to this section on changes in farm size and organization can be found in this quotation from *Roots of the Farm Problem* (4):

United States) which benefited only those who remained in farming and this has caused a surplus of labor (in farming) with resulting underemployment and low incomes (of) a sizeable group in agriculture. The Task ahead . . . is to develop programs which will benefit both groups . . . These programs must take into account the output-increasing effect of either lowering the price of inputs or raising the price of farm products above market-clearing levels. By concentrating on the true basis of the problem—the overly large supply of labor in agriculture—a policy can be established toward solving the farm problem, a problem which has developed over several decades and will likely require several decades to solve”.

Agricultural productivity (the relationship of total farm output to total production inputs) in Canada has been increasing at an estimated annual rate of

almost two per cent from 1950 to 1969 (7). The rate of increase in productivity since 1950 is the result of an annual increase of 2.3 per cent in farm output and an increase of .4 per cent a year in production inputs. Broadly classified, total inputs include three main factors of production, real estate, labor and capital. Since 1950, the decline in the farm labor force has been one of the most important factors contributing to productivity growth. In 1949-51, 16 persons were supplied with food by the production of one farm worker: in 1967-69, it increased to 40 persons (8). These trends in productivity growth are expected to continue in the future.

Role of Government in Farming

What is the role of government in the future of farming? Basically, the role of government lies in providing the economic environment through policies and programs which can provide or assist in providing the agricultural sector with the means of reaching the national goals. These goals include the primary objectives of full employment, price stability, a viable balance of international payments and equity in the distribution of national product. It is within this overall framework that the role of government at all levels will be determined.

There is, however, likely to be some changes in emphasis conditioned by the changes in the political environment, the changing urban-rural dichotomy, the changing values of farmers and urban people and, not least, the changing organizational structure of farming itself. Government agricultural policies in the early part of this century were directed primarily toward land settlement. The next emphasis came in the form of large inputs of public funds for research (particularly for production), extension education, price supports and lately, for credit programs to increase the capital input on farms.

CANADIAN AGRICULTURAL POLICY (9)

The dynamic nature of Canadian agriculture and the structure anticipated for this sector of the economy in 1980 suggest a thorough and comprehensive evaluation of agricultural policies and programs, with the objective of improving upon them to meet the needs of agriculture and of the total Canadian economy. For agricultural policies to be most effective, they must be compatible with the overall goals of the Canadian economy.

The Economic Council has defined these goals of the Canadian economy, indicated a need for balance and compatibility among them and evaluated progress toward them with the passage of time (10). Application of these goals to any particular sector

of the economy must be done with care and judgment, but they can and should be applied to each sector including agriculture. Yet, within a sector such as agriculture, most restricted goals can also be delineated.

Goals for Canadian Agriculture

As a proper foundation for policies and programs within agriculture, determination of targets must be established. This will also make it possible to evaluate progress and assess the need for policy revision over time.

Four major goals for Canadian Agriculture are recommended:

- 1) *Development and maintenance of agriculture as a viable sector of the economy*—Agriculture, along with other sectors, must be economically sound if it is to exist. In some countries, the lack of resources, coupled with high production costs, raises the question of the viability of agriculture. In Canada the physical resource endowments, along with the interests and drives of people engaged in agriculture, support the goal of a viable agriculture.
- 2) *Agriculture is expected to contribute significantly to the Gross National Product of Canada*—Contemplating the growing world population and the expanding domestic demand for food, it is logical to expect that Canadian agriculture will remain an important element in Canada's economy.
- 3) *Resources in agriculture should be used efficiently*—Land, labor, capital, management and technology in agriculture should be combined in such a manner that efficient and economical production results. Resource shifts within agriculture and other sectors should aim at improved efficiency. This principle of efficiency applies to primary production, input supply firms, marketing agencies and all related agribusiness firms.
- 4) *The living standard of people engaged in agriculture should be comparable with the level attained by those outside of agriculture*—In this context, the standard of living takes into account the necessities and conveniences of life, opportunities for educational and cultural advancement and other factors which make for a just society.

As the Canadian economy develops and as the agriculture sector moves toward its goals, some

major problems develop within agriculture. For example, to reach its goals, structural reform and adjustment in agriculture are necessary, however, these processes involve shifting people out of agriculture, specialization of production by farms and by regions, increased size of farm and firm, adoption of new technology, new combinations of production resources, restructuring of markets and bargaining positions and other changes. These changes can be painful and present some of the most serious problems facing the agricultural economy at this time. Policies must therefore, be developed to alleviate these problems.

In developing policy and choosing programs for implementation in Canadian agriculture at this point, a basic decision must be made as to the general thrust of action by federal government. With the trend toward rapid agricultural adjustment, new technology and structural reform, the following policy alternatives present themselves:

- 1) take measures to accelerate transition and get agriculture into a more viable condition as soon as possible; or
- 2) take measures to retard transition in order to substantially reduce the social and economic impact on the people involved; or
- 3) take measures to permit the continuation of the transition, and endeavor to facilitate these shifts, and reduce social repercussions without unduly impeding change.

Option 3 would permit the Government to play a significant role on behalf of the people of Canada without becoming unduly involved. Selection of this option and approval of the related programs would tend to establish a Canadian agricultural policy aimed at balancing production and consumption on a flexible basis, but at a level that would generate a satisfactory income for those people engaged in agriculture.

Adjustment Policy

Within the framework of the goals previously recommended for Canadian agriculture and assuming the general direction of government action is as indicated by Option 3, it is possible to discuss *agricultural adjustment policies* that would be required to bring resources into balance within agriculture and between agriculture and other sectors. Such policies must take into account the three main classes of farms found in Canada today; that is, viable commercial farms, units with the potential to

become viable, and farms which lack the potential to become viable. Recent data and analyses reveal that the 430,500 census farms of 1966 could be stratified with about one-third in each of these three classes.

Although the market economy can be expected to strongly influence the rate of adjustment in agriculture, it is not realistic to expect a complete solution through this machinery particularly in the third group of farms that lack the potential for viability.

A continuing development in agriculture is the need for constant adjustment of the total production plant, and the individual units within it, to the total demand situation and to improve levels of profitability within that situation. This adjustment affects both the highly-productive commercial sector where, in many instances, returns to labor and capital are low compared with other industries, and also the smaller farm enterprises.

Given the economic push of rising costs and decreasing incomes within agriculture and the pull of relatively higher income prospects in non-agricultural sectors, a great deal of structural reform or adjustment is already occurring in agriculture. Decreased farm numbers, expanded farm size, more enterprise specialization and changing resource mix are prominent in Canada, and also in many other developed nations. In spite of the current rate of adjustment in agriculture, it is clearly necessary to accelerate this process. Straight-line projections of trends in the past twenty years to 1980 indicate that by 1980, farm numbers will be down to 315,000 but today's farm income is sufficient to support only about 150,000 farmers with labor earnings of \$4,000 each. Hence the need for accelerating the transfer of people out of agriculture provided that people want to leave agriculture, and provided that there are off-farm opportunities for them. With the current surplus of some main agricultural products, there is also a need to, at least temporarily, remove some land from production. At the same time, new technology, rising costs and narrow profit margins emphasize the need for further adjustments *within* agriculture.

The main objective of the accelerated agricultural adjustment is the improvement of net income for those leaving farming as well as for those remaining within agriculture. Yet the process of acceleration is constrained by several factors; for example, the relative old age and low educational levels of many farmers, their lack of the skills required for non-farm employment, the scarcity of nonfarm employment opportunities, lack of information on the nonfarm opportunities, social and personal constraints and others.

The Task Force Report and Agricultural Policy (11)

The Task Force Report (12) contains several general and many specific recommendations for changes in Canadian agricultural policy. The Task Force suggests that Canadian agriculture should emphasize efficiency and competitiveness, should work toward freer trade internationally, should emphasize more planning, and should move toward less, rather than more involvement of government.

It emphasizes that:

- surpluses must be controlled,
- government should provide temporary assistance to control surpluses,
- ineffective subsidies should be phased out,
- non-viable farmers should be assisted in leaving the farm,
- farm management must be improved,
- both government and private endeavor in agriculture should use modern management tools, and
- government, with consent, must be prepared to use the necessary degree of persuasion to accomplish these ends.

The Task Force also emphasizes the very great dependence of agriculture's survival upon research, technological development and good management.

Agriculture, as stressed by the Task Force, is much more than farming and certainly much more than production. Consequently, the direction for national policies should tend to re-emphasize the intimate relationship between agriculture and Canada's socio-economic and political objectives.

The Task Force recommends limited government involvement in agriculture in the areas of subsidies, support prices, and similar legislation, but does emphasize and stress the need for improved and continued government involvement in other areas. In brief, the four main operational functions of government as recommended by the Task Force are:

- 1) *forecasting* problems and opportunities,
- 2) *planning* policies and programs,
- 3) *implementing* policies and programs,
- 4) *evaluating and reviewing* programs and budgets.

In performing these basic operational functions, the Task Force suggests that government will need specific objectives and will need to solicit direction from the industry in identifying goals.

A National Agricultural Advisory Council is recommended to advise on policy and to serve as a two-way pipeline between the government and the agricultural community. There is continued emphasis on efficiency and optimum resource use. In this context, the Task Force recommends the following for consideration:

- voluntary land diversion programs,
- a more liberalized grain marketing quota system,
- encouragement of farm mobility,
- marketing co-ordination on a national basis,
- market-orientated research,
- abolishment of traditional price supports, to the extent that they are used,
- more flexible or competitive pricing policies for agricultural products,
- increased communication, extension, and information dissemination,
- a strong emphasis on production and marketing efficiency.

One of the more significant aspects of these proposals is the implied emphasis on more effective market reaction to changing conditions of supply and demand.

CONCLUSION

The technological and economic revolution in Canadian agriculture has seen many farmers adapting to change. Some people are improving their management and taking advantage of economies of scale and proportion while others are obtaining part-time work off the farm or moving out of primary production altogether. These adaptations, together with changes in international trade and related economic circumstances, have created a need for a new look at total Canadian agricultural policy and agricultural adjustment policy. This paper has reviewed the essential premises and ingredients of agricultural policy, related these to current and anticipated farm problems and goals and used the product as a basis for outlining the basic policy elements required to facilitate agricultural adjustment and economic viability for agriculture.

In conclusion, it must be emphasized that even the most imaginative, streamlined policy for agriculture and for adjustment will be successful only if it is compatible with the dynamic needs of the people involved in agriculture and if these people endeavor to use the policies to their best advantage.

NOTES AND REFERENCES

- (1) Both exports and imports are valued at 1948 prices.
- (2) Heady, E. O. and L. G. Tweeton, *Resource Demand and Structure of the Agricultural Industry*, Iowa State University Press, 1963, p. 4.
- (3) The index of prices paid by farmers overstates the amount of the squeeze. This is because the index is calculated using a 1938 weight base when labor inputs were relatively more important than today. Thus, the sharp rise in farm wage rates has an inordinate influence on the total index.
- (4) Heady, E. O., *Roots of the Farm Problem*, Iowa State University Press, 1965.
- (5) This section is based on an article by Z. Yankowsky, Economics Branch, Canada Department of Agriculture, "Agricultural Demand and Supply Projections for 1980", *Canadian Farm Economics*, Volume 3, No. 6, February 1969.
- (6) This section is based largely on the paper by G. R. Purnell, A. B. Andarawewa and R. A. Stutt, *Outlook in Patterns and Practices in Agriculture in 1980*, Pub. No. 69/1, Economics Branch, Canada Department of Agriculture, January 1969.
- (7) Furniss, I. F., "Agricultural Productivity in Canada: Two Decades of Gains", *Canadian Farm Economics*, Volume 5, No. 5, December 1970.
- (8) Unpublished estimates, Economics Branch, Canada Department of Agriculture, 1970.
- (9) The information in this section is mainly taken from two reports of the Economics Branch, Canada Department of Agriculture: 1) *Essential Elements of Agriculture Adjustment Policy for Canada*, by G. R. Purnell (unpublished) and 2) *Implications of the Outlook for Adjustment*, by D. H. Plaunt, to be published in the *1970 Outlook Proceedings*.
- (10) Fifth Annual Review of the Economic Council of Canada, Queen's Printer, Ottawa, September 1968.
- (11) This part of the paper draws heavily on an address prepared by Mr. W. E. Jarvis, Assistant Deputy Minister, Canada Department of Agriculture, presented to the Western Canadian Fertilizer Association, September 21, 1970.
- (12) *Canadian Agriculture in the Seventies*, Report of the Federal Task Force on Agriculture, Queen's Printer, Ottawa, December 1969.

AGRICULTURAL PRODUCTIVITY IN CANADA: TWO DECADES OF GAINS



I. F. Furniss

This paper examines the trends in overall productivity of Canadian agriculture; analyzes the sources of productivity gains; and draws some implications for the agricultural community.

The period analyzed in the study covered the two decades, 1950 to 1969, inclusive. Projections of trends were made to 1972. The procedure employed was that of constructing aggregative index numbers in constant (1949) prices (factor and product). Trends were projected by the method of ordinary least-squares regression.

The study found that agricultural productivity in Canada has been rising at a rate of almost two per cent a year

since 1950. However, since 1960, the rate of change in productivity has increased to two and one-half per cent a year. This has happened principally because of a rise in the rate of increase in farm output more than offsetting increases in total inputs. The article deals with some of the implications of changing productivity and notes that gains in productivity are a necessary but, in themselves, not a sufficient condition for improved incomes. Under specific assumptions as to the future organization of agricultural production, the conclusion is drawn that major gains in agricultural productivity arising from substitutions of capital for labor may have reached a short-run plateau and that future gains may lie more with improvements in quality of the inputs and outputs.

"Consumers...benefit from agricultural...research and development...farmers gain also...but only a relatively few...are able to reap significant monetary gains...total research and development expenditures on agriculture... (are)...about \$4 per capita..."

"Real gross domestic product...per man in agriculture has increased at an annual rate...of six per cent...since 1960...(exceeding)...the growth rates in labor productivity for the rest of the economy..."

"Gains in productivity...are a necessary...condition...for improved incomes...(but)...gains which lead to total output increasing more rapidly than total demand can lead to depressed farm product prices..."

"Development of countervailing powers are necessary conditions for the equalization of resource earnings..."

"...Part of the explanation for the reduced rate of outmigration from farming lies...in the rising...unemployment rate in recent years..."

The objective of this paper is to analyze the changes in overall agricultural productivity during the two decades, 1950 to 1969. It attempts to identify the major sources of productivity gains and to make some short-run predictions. Finally, an attempt is made to draw some inferences for the agricultural community.

The study of agricultural productivity is important because changes in productivity have implications for farmers and farm organizations in terms of income effects, for the suppliers of farm inputs in terms of the demand for factors of production, and for farm product processors in terms of the cost and supply of raw materials for processing. There are important implications, too, for consumers in terms of food costs, and for governments in terms of the development of policy measures.

MEASUREMENT OF AGRICULTURAL PRODUCTIVITY

Agricultural productivity, as used in the context of this paper, is defined as the relationship between

total farm output, measured in constant prices and total farm inputs, also measured in constant prices. Thus, the relationship between output and input, which is called agricultural productivity, is a measure of output per unit of input. Since inputs are measured in constant prices; that is, the effects of changes in factor and product prices have been removed, the result is a relative measure of the real (constant-price) costs of production. A rising index of agricultural productivity indicates, for example, that the real costs of producing farm products are declining.

In measuring the production inputs in agriculture, an attempt is made to reflect all of the factors of production, both those provided by the farm sector and those purchased from the nonfarm sector. The valuation of purchased inputs is relatively simple: they are valued at their factor cost (at some base-year price) to the farm sector. However, the valuation of inputs generated by the farm sector itself is not so simple. Generally, for purposes of productivity analysis, farm-produced inputs are valued at

their opportunity cost in base-year prices, that is, the value (earnings) of the same resources in their best alternative use. This can be viewed as the resource earnings foregone by using the resources in agriculture. The major inputs arising in the farm sector are the investment costs of real estate owned by farm proprietors; the labor of farm operators and their family help; and the investment of farm operators in machinery and productive livestock. Again, the annual investment costs include the interest foregone in the best alternative investment and the consumption (depreciation) allowances (1).

The measurement of inputs in terms of base-year prices implies two important assumptions. The first assumption is that the base-period selected represented a time period when factor demands and supplies were in equilibrium while the second is that there has been no quality change in the nature of the inputs. Gains in agricultural productivity are due, therefore, as much to what is not measured (or not adjusted for) as to what is measured. Productivity growth can be the result of both improved efficiency in the combination of factor inputs in the production process and improvements in the quality of the resources employed.

Improved efficiency in resource combination in agriculture can arise, for example, through an increase in size of operation (volume of business) so as to take advantage of technology which enables fewer workers with more capital per man to produce a greater output per man. Gains in productivity can also reflect a reduction in the price of one input relative to others. Changes such as this account in part for the substitution of one input for another.

There is a problem involved in measuring output trends which does not arise to the same extent in measuring inputs: this is the wide year-to-year fluctuations which can occur in the volume of production, particularly of crops. Generally speaking, the larger the aggregation of output, in terms of crops and area of production, being measured, the smaller is the effect of annual fluctuations in output of any one crop or region on the total output. However, since grain production is very important in the Canadian farm output mix, year-to-year fluctuations in total farm output which occur, even at the national level, are considerable. These fluctuations are usually attributable to weather as it affects planting, growing and harvesting conditions either in any one year or cyclically. Modern farming practices and technology have operated to reduce some of the effects but cyclical trends or very favorable or unfavorable years still occur. Therefore, to measure real trends in output, it is necessary to attempt to remove the year-to-year or cyclical effects.

One way this may be done is by taking the observed data and fitting a mathematical trend line, either on the basis of the actual data or in logarithms. The real growth rate is then measured on the basis of the predicted values, which may or may not fall on the fitted trend line, in any one year (2).

The measure of farm output relates, conceptually, to all farm production intended for sale to non-farmers. In this paper, it is assumed that all such production intended for market is sold in the same production year and in the form that it was originally intended to be sold. Again, since farm output is measured at base-year prices, the total output mix reflects the price relationships (and hence, the demand-supply situation) which prevailed in the base-year period. Farm output could be overvalued (undervalued) if a continued oversupply (undersupply) of one product were to depress (inflate) the price of the product in oversupply (undersupply). But this would not entirely negate the measure of total farm output—the quantity produced of the product in oversupply (undersupply), even if it were produced in decreasing (increasing) quantities, would still be valued at its base-year unit price. In other words, an assumption is being made that the base year selected was a year in which there was an equilibrium between demand and supply for all farm commodities and that this equilibrium was maintained throughout the study period. However, it is changes in relative product prices which help to explain, in part, shifts between farm enterprises. Again, then, part of the productivity gains (or losses) are due as much to what is *not explained* in output changes as to what is explained. An overvaluation of farm output because of a relative price decline in product price would tend to overstate farm output, unless offset by an exact undervaluation of another product, and thus, overstate the productivity of the inputs.

IMPLICATIONS OF CHANGES IN PRODUCTIVITY

Productivity gains (or losses) in agriculture have important implications for all sectors of the economy. For farmers generally, productivity gains occasioned by improved technology, whether of an output-increasing or an input-decreasing nature, mean a reduction in the real costs of production and, with a given product price, increased profitability for the farmers who initially adopt the new technology. Productivity gains are a necessary, but not a sufficient condition, for improved farm incomes. Increased profitability in agriculture from increased productivity of those factors responsible

can mean an increased demand by all farmers for the new factors of production and consequently, increased output. Furthermore, the increased demand by farmers for the profitable factors of production can result in higher prices for those factors with reduced profits to farmers and increased profits to the suppliers of the factors. If product prices to farmers fall because of increased output following from lower production costs, then processors of farm products can get their raw materials at lower prices, so gaining from the increased productivity of the production factors in farming. Finally, should all or part of the lower real costs of the raw materials in the food supply chain be passed on by the processors and distributors to consumers, then consumers would benefit through lower food prices occasioned by the saving in resources employed in the production of agricultural commodities.

In a perfectly competitive economy, the gains in agricultural productivity should accrue, theoretically, to each sector of the economy so that, in equilibrium, all resources employed would earn their opportunity price. But the economy is not perfectly competitive in practice. The greater the extent of the departures from perfect competition; that is, the more the imperfections, the more the gains from productivity will accrue, in whole or in part, to those sectors of the economy, or individuals, with the greatest relative bargaining strength.

PRODUCTIVITY GROWTH

The rate of growth in agricultural productivity during the past twenty years is estimated to have been almost two per cent a year. This increase was the net effect of a rise of more than two per cent a year in farm output and an annual growth in the volume of farm inputs of less than half a percentage point. Since 1960, the rate of growth in farm productivity has increased because of an increased rate of growth in output more than offsetting the increases in inputs, of more than one per cent a year, resulting in a net productivity growth rate of two and a half per cent a year.

The index of overall agricultural productivity was estimated at 173 (1949 = 100) for 1969 (Table 1). This was an increase of more than five per cent from the level of the 1968 index and was entirely due to a corresponding rise in total farm output, since the level of farm inputs was estimated to be unchanged from 1968 to 1969. Much of the increased total farm output in 1969 was due to greater crop output (not shown in the tables). Crop production (the words "output" and "production" are used synonymously in this paper, but, at all times, both terms

refer to "production intended for market") rose by almost 10 per cent from 1968 to 1969 while livestock and livestock product output increased by less than two per cent between the same years.

Projecting the trends in output and inputs would indicate a level of agricultural productivity of 176 (1949 = 100) by 1972 on the basis of the 1950-69 trend (Projection I, Table 1). This level would still be less than the peak productivity index for 1966 of 180 (1949 = 100). However, should the more recent trend; that is, the trend from 1960 to 1969, be maintained, then the productivity index could reach almost 184 (1949 = 100) by 1972, exceeding all previous levels (Projection II, Table 1). On the basis of the longer-term trend, the index of production inputs may be little changed from the 1969 level by 1972. However, if the trend of the past ten years is maintained, then the input index could reach a level of 107 (1949 = 100) by 1972. The longer-term trend in output would indicate the possibilities of an output level by 1972 only one index point above the 1969 index. However, projecting the trend of the past decade would indicate a level of output nine to ten per cent more than the 1969 output and 16 per cent more than the 1965-69 average.

The longer-term trend for Canadian farm production indicates that output of livestock and livestock products is rising faster than crop output. The volume of crop production is estimated to have increased by two per cent a year since 1950, compared with an increase of almost three per cent a year in livestock and livestock production. In the shorter-

TABLE 1—INDEXES OF OUTPUT, INPUTS AND PRODUCTIVITY, CANADIAN AGRICULTURE, SELECTED PERIODS AND YEARS, 1950 TO 1969 WITH PROJECTIONS TO 1972

Period or Year	Farm Output	Production Inputs	Productivity Ratio
1949 = 100			
1950-54.....	120	95	126
1955-59.....	127	94	135
1960-64.....	140.5	96	147
1965.....	160	99	162
1966.....	180.5	100	180
1967.....	158	103	153
1968.....	168	102	164
1969.....	177	102	173
1965-69.....	169	101	166.5
1972 Projections			
I.....	178	101.5	176
II.....	196	107	183.5
per cent			
Annual Growth Rates			
1950 to 1969..	+ 2.3	+ .4	+ 1.9
1960 to 1969..	+ 3.6	+ 1.1	+ 2.5

run, however (that is, since 1960), the rate of growth in crop production has outstripped the annual increases in livestock and livestock products. The former averaged more than five per cent growth a year while the latter grouping averaged less than three per cent annually since 1960.

Projecting these trends in crop and livestock production would indicate that, by 1972, the crop output index, if on the longer-run trend line, will be at a level of 201 (1949=100). This projected level of output is less than the actual 1969 output but is above the levels for all other years in the last twenty years, except for 1963 and 1966. With the usually more stable growth rate exhibited for livestock and products, output of this grouping in 1972 could lie between index levels of 172 and 174 (1949=100). These predicted output levels would, of course, exceed the actual output levels recorded for any previous year to date, and the increase over the actual 1969 level would amount to between eight and nine per cent.

SOURCES OF PRODUCTIVITY GAINS

In a broad sense, productivity gains have occurred in agriculture because the rate of increase in total output has exceeded the rate of increase in production inputs, as they have been measured. However, the existence of this relationship is not sufficient to explain the source of the productivity gains. If, for example, the total input mix were to remain constant over time, then the main source of productivity gains would have to be found in increased efficiency of resource use or even in cyclical improvements in weather conditions. But the input mix in farming has not remained constant over time, so sources of productivity gains are found not only in improvements in production organization but also in the nature of the new inputs and in the substitutions among inputs. Figure 1 illustrates the changing relative importance of the major input groupings since 1949. In the following sections, some of these changes will be discussed in detail.

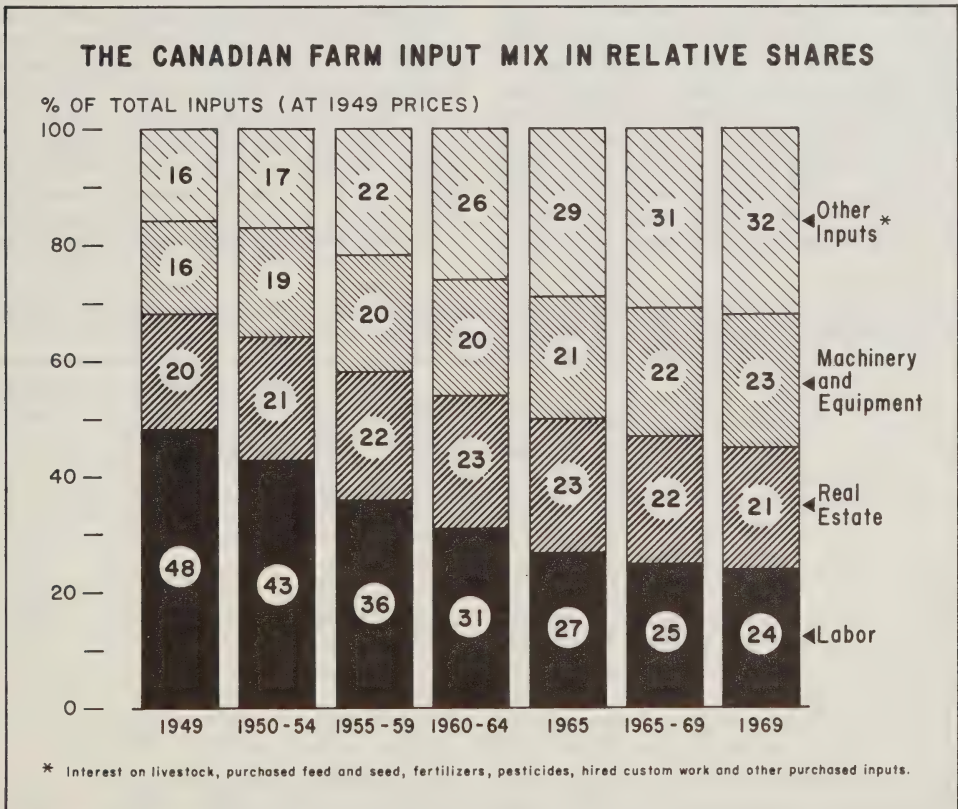


FIGURE 1

Changes in the Input Mix

Total *real estate* inputs in Canadian agriculture have been relatively stable during the past two decades, both in terms of volume and share of total inputs. The growth of real estate inputs averaged one per cent a year during the period 1950 to 1969 but, since 1960, the average growth rate has been negligible (Table 2). Real estate inputs reached a peak index of 116 (1949=100) in 1967 but declines were recorded successively in each year since to 1969. The decrease from 1968 to 1969 was almost five per cent. All of the items comprising the real estate input category, with the exception of one relatively minor item, contributed to the total decrease between those two years (3). This situation reflects in large measure the depressed farm product market conditions of 1969, especially in the Prairie Provinces. In 1969, total Canadian farm building construction was reduced from year-earlier levels as were building repairs, all in real terms. (Estimated expenditures on building repairs and new construction declined even in current dollar values). However, a large part of the longer-term stability in the total real estate input category is, of course, due to the relatively fixed nature of the total land supply for agriculture.

The total land area in farms in Canada was unchanged from 1951 to 1966 and it increased by only about one per cent from 1961 to 1966. Improved land area in farms showed a rising trend during these years. In 1966, it was about 12 per cent more than in 1951 and about five per cent greater than in 1961. More definitive descriptions of the trend in

land area in farms since 1966, both total and improved, will have to await the 1971 census. However, in view of the general economic conditions in farming since 1966, it does not seem likely that there would have been any significant increase in the total land area, and the increase in improved land in farms may have leveled off. Present evidence indicates that most of the increased investment since 1966 in farm real estate (in current dollars) is a result of general increases in land values, occasioned in part by non-farm demand for land, at least up to the end of 1968. On the basis of recorded sales, land values in the Prairie Provinces actually declined (in current dollars) from 1968 to 1969 with the greatest decline, more than 11 per cent, in Saskatchewan. Such a decline as this reflects purchasers' diminished expectations of the income potential of farmland as well as increased mortgage credit costs.

Labor employed in Canadian agriculture (4) has shown a continually declining trend throughout the 1950's and 1960's (Table 2). Since 1950, the rate of decrease has averaged about three and a third percentage points a year but this rate of decline eased off in the 1960's to just over three per cent a year. However, the rapid rate of attrition which characterized the farm labor force for much of this period, particularly since 1966, may be leveling off. Total employment in agriculture in 1969 at 535,000 persons was only about two per cent fewer in numbers than in either 1968 or 1966. Preliminary data for 1970 would indicate a possible decline in numbers of five per cent from year-earlier levels. Projecting the

TABLE 2—INDEXES OF PRODUCTION INPUTS (FACTORS OF PRODUCTION), CANADIAN AGRICULTURE, SELECTED PERIODS AND YEARS, 1950 TO 1969 WITH PROJECTIONS TO 1972

Period or Year	Real Estate	Labor	Machinery and Equipment	Capital Inputs				Total Production Inputs
				Purchased Feed and Seed	Fertilizer and Limestone	Other	Total Capital	
1950-54.....	99	85	115	1949 = 100				95
1955-59.....	105	70	123	95	107	110	108	94
1960-64.....	112	61	124	123	116	131	124	96
1965.....	112	55	136	142	174	160	138.5	99
1966.....	115	50.5	142.5	170	243	170	157	100
1967.....	116	52	148	181	282	178	167	103
1968.....	115	51	151	185	311	184	173	102
1969.....	109.5	50	153	180	335	185	174	102
1965-69.....	114	52	146	200	273	188	179	101
1972 Projections								
I.....	120	40	151	183	289	181	170	101.5
II.....	115	43	165.5	206	321	206	185	107
Annual Growth Rates								
1950 to 1969.....	+1.0	-3.3	+1.5	per cent				
1960 to 1969.....	+ .2	-3.1	+3.1	+4.5	+8.8	+3.5	+3.1	+ .4
				+5.0	+4.1	+2.6	+4.0	+1.1

trend of the past ten years would indicate a total farm labor force of about 465,000 persons by 1972, 13 per cent fewer than the actual numbers in 1969.

The rate of net outmigration of labor from farming is explained, in a perfectly competitive, free-enterprise economy, by the desire of workers to shift to occupations yielding the highest labor income which they can command. Thus, when longer-run incomes are depressed in farming, farmers, if they are income maximizers, will seek to move to occupations yielding higher returns. If this theory were to operate fully in practice, then incomes should tend to be equalized between farm and nonfarm workers, for comparable skills and resources employed. There is, however, a large gap between theory and practice and various economic studies bear this out (5). Rather, the hypothesis is that the national unemployment rate is much more important in explaining the net outmigration of farm labor than is the farm/nonfarm wage ratio. The Canadian unemployment rate during the 1950's averaged slightly more than four per cent but, during the 1960's, it averaged about five per cent a year. By mid-1970, the unemployment rate was running at almost seven per cent (seasonally adjusted) a year, equaling the high unemployment rates of the 1958 to 1961 period. These unemployment rates support the hypothesis that the reduced rate of net outmigration of farm labor in the 1960's can be traced to the generally higher unemployment rates, principally in the nonfarm sector, of those years.

In addition to the overall decline, during the past two decades, in the size of the farm labor force, there have been important structural changes in it. When the farm labor force is classified into its three main structural components (farm operators, unpaid family labor and hired labor), it is found that the greatest relative decrease in numbers has been in the family labor portion (operators plus unpaid family labor) and the least, in the hired labor component (6). Consequently, there have been important shifts in the relative importance of each group of workers in agriculture. Paid labor in the 1950-54 period comprised 12 per cent of the total farm labor force but, by 1965-69, it had increased to 18 per cent. While both farm operators and other family help (unpaid) have declined in relative importance, the greatest relative decrease since the 1950's has been in the numbers of unpaid family workers. Thus, in the first half of the 1950's, unpaid family help comprised almost a quarter of the total farm labor force, but, by the last half of the 1950's and the first half of the 1960's, it had decreased to a fifth. However, in the last half of the 1960's, unpaid family help increased again in relative importance to 22 per cent of the

total farm labor force. This reversal of trend further supports the hypothesis that it is the national unemployment rate which is an important factor in determining the rate of outmigration from the farm sector. A rise in the national unemployment rate which results in a slowdown in the net outmigration of labor from farming most directly affects the youngest portion of the farm labor force, that is, the unpaid family labor plus the younger farm operators.

The rate of growth in *farm machinery* inputs (7) amounted to one and a half per cent a year from 1950 to 1969 (Table 2). However, the last decade of the period saw an increase in the growth rate to more than three per cent a year—the converse to the rate of decline in the farm labor force during the same years. The increase in all farm machinery inputs from 1968 to 1969 was slightly more than one per cent, reflecting mostly an increase in the interest on investment and depreciation portion of the total machinery and equipment inputs. Inputs of fuel, oil and lubricants were estimated to be down by almost one per cent between these two years.

Feed and seed (including nursery stock) inputs (8) purchased by farmers from the nonfarm sector have been rising by four and a half per cent a year in the past two decades (Table 2). This represented the second highest rate of increase in a major input grouping, exceeded only by the growth rate for fertilizer inputs (if fertilizer inputs are categorized as a "major input grouping"). However, since 1960, the rate of increase in purchases of feed and seed increased to five per cent a year, exceeding the growth rate in fertilizer inputs for the same period. Although purchased seed and nursery stock inputs increased relatively more than purchased feed inputs during the two decades since 1950, they still represented only a small proportion of the total inputs in this grouping of purchased feed, seed and nursery stock. For example, in 1950, purchases of seed and nursery stock represented about two per cent of that total, but by 1960, seed and nursery stock represented seven per cent and, by 1969, almost nine per cent.

Of all the groupings of farm inputs, the rate of expansion in *fertilizer and limestone* used by farmers in the past two decades has been the highest, almost nine per cent a year (9). But farmers cannot continuously expand the consumption of one input such as fertilizer at a high rate, especially in the face of declining factor/product price ratios and sales per farm unit. (There are also likely to be technical reasons which will inhibit continued rapid expansion of nitrogenous fertilizer inputs but these will not be dealt with in this article). Fertilizer and limestone

consumption peaked in 1968 at an index of 335 (1949 = 100) and then dropped by 18 per cent in 1969. This sharp decline in fertilizer use in 1969 was a major contributor to the reduced average annual rate of growth in this input grouping during the 1960 to 1969 period to four per cent.

The greatest absolute and relative expansion in fertilizer consumption has been in the Prairie Provinces. Comparing the first half of the 1960's with the last half, the tonnage of mixed fertilizers and fertilizer materials sold in the Prairies tripled, while the increase for all of Canada was about 70 per cent between the same two five-year periods. Fertilizer consumption by Prairie farmers increased, therefore, from about a fifth of total Canadian consumption to more than a third of the total, in one decade. Furthermore, this increased consumption was largely in the form of nitrogeous fertilizers. For the whole of Canada, sales of fertilizers in total elemental forms doubled from 1960-64 to 1965-69. However, the increase in the nitrogen content of fertilizers in the same period was more than 150 per cent. As a percentage of total sales, the nitrogen portion of fertilizers increased from about a quarter of the total in the first half of the 1960's to a third of the total in the last half of the decade.

Finally, that grouping of farm inputs which is designated *Other Inputs* (10) increased by 3.5 per cent a year from 1950 to 1969, and by 2.6 per cent annually since 1960 (Table 2). Within this broad category of inputs, the most significant increases have occurred in the use of electric power, custom work, pesticides (including herbicides), and livestock services. However, from 1968 to 1969, consumption of a number of inputs in this grouping decreased resulting in an increase of less than two per cent for the "other inputs" grouping as a whole. Livestock services, for example, decreased by slightly more than four per cent.

Changes in Farm-Produced Inputs

So far in this section, the nature and sources of productivity gains which are attributable to the changes in consumption of specific inputs have been discussed. It is important also to consider the changes which are occurring in the proportion of inputs which arise from the farm sector itself and those which are obtained from the nonfarm sector. Throughout the 1950's and 1960's, the agricultural sector continued to show an increasing dependence upon the nonfarm sector as a source of production inputs. However, the rate of rise in this increasing dependence slackened off in the last half of the 1960's,

and these five years became a period of relative stability in this relationship. Should this situation continue, it will mark an important watershed in the structure and source of inputs for agricultural production. From 1960 to 1969, the rate of growth in *purchased inputs* (11) averaged more than two per cent a year (Table 3). This was about one-half the rate of growth in the "capital" input grouping but, in addition to including most inputs classified as capital inputs, the purchased input grouping also includes hired labor, and this explains, in part, the lower growth rate for the purchased inputs group as a whole.

TABLE 3—INDEXES AND RELATIVE SHARES OF PURCHASED AND NON-PURCHASED INPUTS, CANADIAN AGRICULTURE, SELECTED PERIODS AND YEARS, 1950 TO 1969 WITH PROJECTIONS TO 1972

Period or Year	Purchased Inputs	Non-Purchased Inputs	Purchased Inputs	Non-Purchased Inputs
	1949 = 100		per cent of total inputs	
1950-54.....	97	94	39	61
1955-59.....	110	84.5	44.5	55.5
1960-64.....	122	80	49	51
1965.....	134	77	52	48
1966.....	140	75	53.5	46.5
1967.....	143	78	53	47
1968.....	142	78	53	47
1969.....	143	77.5	53	47
1965-69.....	140.5	77	53	47
1972 Projections				
I.....	152	70	57	43
II.....	157	76	56	44
Annual Growth Rates			per cent	
1950 to 1969.....		+2.5	-1.3	
1960 to 1969.....		+2.2	- .3	

Non-purchased inputs, that is, the inputs of farm operators (proprietors) and their families, declined by almost one and a half per cent a year during the twenty-year period, 1950-69 (Table 3). However, since 1960, the decline has been less than one-half per cent a year. In terms of relative proportions, farm-produced (non-purchased) inputs made up just over 60 per cent of total inputs in the 1950-54 period. They declined to about 50 per cent in the 1960-64 period (1964 was the watershed year when purchased and non-purchased inputs were each one-half of total inputs) and averaged 47 per cent of total inputs during the last half of the 1960's.

Research and Development

One of the major sources of productivity gains implicit in the index of agricultural productivity are expenditures on research and development, mainly by public agencies. These expenditures are not included in the estimates of production inputs, hence,

part of the productivity gains shown derive indirectly from this source. In 1967-68, total operational expenditures on agricultural research and development (R and D) were estimated to be \$74.7 million, of which governments (principally the federal government) provided almost 64 per cent (12). Expenditures by the universities on agricultural R and D in the same year comprised 29 per cent of the total, but only seven per cent was contributed by the nonfarm sector. Total federal government agricultural R and D expenditures increased during the 1960's. Total current expenditures of the federal government on scientific activities in the fiscal year 1967-68 were estimated at \$37.6 million, 43 per cent more than the *current* dollar expenditures in 1963-64 (13). Even after discounting this increase for the price inflation of this period (amounting to about 11 per cent on the basis of the General Wholesale Price Index), the rise in real expenditures was significant.

Research and development expenditures are, however, only a part of total government expenditures on agriculture and related activities. Although the following figures are not directly comparable with R and D, expenditures for research, education and extension were estimated to total about one-fifth of total government (all levels) expenditures on agriculture in the 1960's (14). This proportion was almost unchanged from the proportion found in the early 1930's. According to the same source, total government expenditures on agriculture in Canada amounted to about \$20 per capita in the mid-1960's compared with \$90 for national defence and \$8 for the Canadian Broadcasting Corporation. Thus, total research and development expenditures on agriculture by governments can be deduced to be about \$4 per capita or less, roughly equal to one-half the per capita expenditures on the national radio and television broadcasting system.

How do expenditures on agricultural R and D affect productivity? Briefly, research and development for agriculture contributes to improved varieties or strains of crops and livestock, to improved machinery and equipment, to the control and/or eradication of diseases and pests of crops and livestock, to the development of newer and improved processes of food preparation and preservation, to an understanding of the factors affecting the rate of adoption of technology and to the improved management of resources in agriculture (15). Public investments in agriculture have been justified up to the present time largely on the basis of increased productivity and the high payoff to society, and because of important characteristics of the agricultural industry which distinguish it from other sectors of the economy.

There are two principal distinguishing characteristics involved, one economic and one biological-physical. The economic characteristic, which is partly due to past public land settlement policies, is manifested in the large number of relatively small-size firms (farms) in agriculture (as compared with non-agriculture), none of which is large enough to support an independent research establishment. Nor are these individual firms (farms) able to recoup the cost of independent research through the market pricing system since all producers sell in the same product markets and at basically the same prices. The biological-physical characteristic lies in the fact that agricultural production, for the most part, is subject to vagaries of the weather and to the nature of the biological growth processes which can vary from a relatively short time-period for broilers to three or more years for cattle. Thus, a farmer's production plans are subject to the influence of economic and physical forces largely beyond his individual control.

A further consideration in support of public research in agriculture is "who are the ultimate beneficiaries?" (16). The benefits to farmers of agricultural research have been stated usually in terms of enabling them to increase output and/or save inputs, that is, to increase productivity. But this does not indicate much about the effect of agricultural research which contributes to productivity gains on farm income except that, as noted previously, increased productivity is a *necessary* condition for higher farm incomes. But it is not a *sufficient* condition. Because of the generally inelastic demand for farm products, especially at the farm level, there is little variation, if any, in the amount of farm products purchased by consumers, with a given change in product price, other things being constant. Furthermore, in a situation of rising agricultural productivity (other things constant), the highly competitive nature of the primary agricultural industry, with a large number of relatively small firms producing farm products, unrestricted entry to the industry, etc., tends to depress farm product prices and to reduce total farm revenues.

Consumers of farm products, in the institutional and economic environment described for agriculture, benefit from agricultural productivity gains occasioned by agricultural research and development by lower real costs for food materials. In fact, much of the rise in retail food prices is the result of added costs for services, in the form of convenience packaging, pre-cooking and other complementary services, rather than of any large increases in the costs of the raw materials of food (and fiber). Of course, it is correct to say that farmers gain also from improved

productivity as consumers of food products, but only a relatively few farmers are able to reap significant monetary gains by early adoption of new inputs or techniques of production. Farmers, as a group, could retain the full benefits of productivity gains due to output-increasing innovations only if it could be assumed that any increase in output resulting therefrom would be absorbed by the product market at the given (current) product price. The effects are somewhat different for input-saving innovations. In this case, more of the benefits could be retained by producers, at least in the short-run, for a given output level. But the nature of the organization of the primary industry in Canadian agriculture is such that the individual farmer would be worse off if he does not adopt new input-reducing and/or output-increasing technology so long as his competitors (other farmers) in the industry do so.

FARM AND NONFARM LABOR PRODUCTIVITY

In making comparisons of productivity on an interindustry basis, one commonly accepted method is to relate output to a single input such as labor. However, in this case, real output usually consists of the value-added portion (including capital consumption allowances) for each industry in the economy. (It can be described also as "net output.") For agriculture, value added corresponds closely to real net farm income, where gross output and nonfarm inputs are valued at implicit prices. (To this is added the investment capital consumption allowances of farm operators.) Although such a measure of productivity purports to relate one input, labor, to the value added in the industry and hence is referred to as "labor productivity", it is still a partial productivity measure. It is a "partial" measure because gains to labor reflect not only changes in the nature of the labor force in terms of skills, but also the changes due to the nature of the productive resources with which labor works, together with the effectiveness with which resources are combined and organized for production (17).

Real gross domestic product (value added) per man in agriculture has increased at an annual rate of more than five per cent since 1950 and at an even faster rate of six per cent a year since 1960 (Table 4). These rates of growth in agricultural labor productivity exceed by a considerable margin the growth rates in labor productivity for the rest of the economy. Furthermore, although the growth rate for agriculture accelerated since 1960, there was a deceleration in the nonfarm sector. In this sector, the growth rate in gross domestic product per man averaged almost three per cent a year since 1950.

TABLE 4—INDEXES OF REAL GROSS DOMESTIC PRODUCT PER MAN EMPLOYED, CANADA, AGRICULTURE AND NON-AGRICULTURAL COMMERCIAL INDUSTRIES, SELECTED PERIODS AND YEARS, 1950 TO 1969 WITH PROJECTIONS TO 1972

Period or Year	1961 = 100	
	Agriculture	Commercial Non-Agricultural
1950-54.....	81.5	77
1955-59.....	102	90
1960-64.....	123	103
1965.....	147	111
1966.....	182	113
1967.....	152	114
1968.....	166.5	119
1969.....	185	119
1965-69.....	166.5	115
1972 Projections		
I.....	187	128
II.....	206.5	128
	per cent	
Annual Growth Rates		
1950 to 1969.....	+5.2	+2.8
1960 to 1969.....	+6.0	+2.3

Sources: (1) *Aggregate Productivity Trends, 1946-1968*, Cat. No. 14-201 Annual, May 1970, Dominion Bureau of Statistics.

(2) *D.B.S. Daily*, July 20, 1970, Cat. No. 11-001, Dominion Bureau of Statistics.

However, from 1960 to 1969, the growth rate was just over two per cent a year compared with the six per cent for agriculture.

In the past decade, the six per cent growth rate in agricultural labor productivity reflects an annual increase of more than two and half per cent in real gross domestic product and a decline of about three per cent each year in employment in farming. In the nonfarm sector, by contrast, output in the form of real gross domestic product has been rising each year by more than twice the agricultural output growth rate. However, employment has been rising also, by three and a third per cent each year, with the result that the gain in labor productivity in the non-agricultural sector was just over two per cent (2.3 per cent) a year.

SUMMARY AND CONCLUSIONS

Agricultural productivity refers to the output produced per unit of input. As such it is a ratio which can be used to evaluate economic efficiency in the industry. It provides, therefore, a measure of the relative change in production inputs, that is, resources employed, to the output produced for market. Since this analysis is concerned mainly with trends over time, all inputs and outputs are

valued at base-year prices so as to eliminate, insofar as possible, effects due to price changes. Furthermore, since this study attempts to measure all inputs and outputs, it provides, in fact, a measure of the real (constant price) costs of production. Consideration also is given to a partial productivity measure, labor productivity, as a means of evaluating relative labor efficiency on an interindustry basis.

During the two decades since 1950, overall agricultural productivity in Canada increased at a rate of almost two per cent a year. This is the result of a rise in total output of more than two per cent a year and an increase in production inputs of less than half a per cent a year. However, in the last decade of the period, productivity gains accelerated to two and a half per cent a year. This resulted from both a greater volume of inputs employed and improved efficiency in resource combination. Since 1960, total output has increased by more than three and a half per cent a year while total inputs rose by just over one per cent a year.

In the years of the 1950's and 1960's, there was a marked decline in the labor input in primary agriculture averaging more than three and a third per cent a year since 1950. However, this rapid replacement of labor with capital as an important source of productivity gains may be nearing an end, barring the introduction of any new labor-saving innovations of significant proportions. Since 1966, the decline in the size of the farm labor force has been much less than it was in previous years. Part of the explanation for the reduced rate of outmigration from farming lies, however, in the rising national unemployment rate in recent years. Significant productivity gains can be attributed also to the rapid expansion in the use of such factors of production as chemical fertilizers and pesticides. Much of this increased expansion in fertilizer use occurred in the Prairie Provinces and this is where much of the increased output occurred in the past two decades.

Farm-produced inputs declined in both absolute and relative importance during the years since 1950. However, in the latter part of the period, that is, since 1960, the rate of decline in the volume of non-purchased inputs leveled off. Most of the increase in total inputs during this decade was in the form of purchased inputs and particularly in such items as purchased feed and seed inputs. Since 1960, the growth in volume of purchased feed and seed inputs used has exceeded the annual growth rate for fertilizer consumption.

Labor productivity in agriculture in the two decades reviewed has shown a much higher rate of gain than labor productivity in the nonfarm sector. In the last decade of the period, agriculture further

increased its lead over the nonfarm sector in this respect. The declining size of the farm labor force, coupled with rising employment of capital inputs, has resulted in much greater relative gains in efficiency in resource combination in agriculture than in the nonfarm sector. In this latter sector, both net output and employment have been rising during the past 20 years.

Much of the research and development which contributes to productivity gains in agriculture is funded in Canada by public agencies. The per capita cost, however, is relatively low, about \$4 a year, or roughly one-half the per capita cost of the national radio and television broadcasting system. On the other hand, much of the benefit from agricultural research and development accrues to consumers in general through lower real costs for food. Farmers benefit, too, as consumers but it is largely the early adopters of technical innovations who benefit in terms of higher resource earnings.

The trends established and the sources of productivity gains identified lead to the conclusion that a plateau may have been reached as to the major gains which can be achieved by a further reduction in number of farm workers, *per se*. This plateau may, of course, be short run in nature. Future aggregate gains, insofar as the productivity of the labor input is concerned, seem likely to lie more with improvements in the quality of the inputs. Following from this and assuming a continuation of the predominance of the individual proprietorship in farming, it seems likely also that there will be no further significant reductions in the total inputs arising from the farm sector, but that the proportion of inputs arising from the nonfarm sector will continue to increase. What form these inputs will take (and whether they will be reflected in the data) is another question. One likely area for expansion would seem to be in the form of managerial services with increased integration between the production, processing and distribution of farm products. This area seems likely to offer greater possibilities for future gains in productivity in Canadian agriculture than does a continuing substitution of capital inputs for labor in the production part of farming.

Gains in productivity in agriculture are a necessary, but not a sufficient condition for improved incomes (and resource earnings). Productivity gains which lead to total output increasing more rapidly than total demand can lead to depressed farm product prices and to reduced total revenues for many commodities. The implication is, therefore, that unless production is market-oriented, increased resource earnings in agriculture cannot be expected in the short run. Furthermore, resource earnings in a perfectly competi-

tive society are basically determined by their opportunity price. The earnings of labor resources are, in turn, determined in part by the qualifications of the labor and the demand for these skills in relation to the supply, and also to the quality (and amount) of the other resources with which labor is combined. The many imperfections which exist, both in product and factor markets, contribute to the disequilibrium, between resource earnings in the farm and nonfarm sectors. One conclusion is, therefore, that the removal of the market imperfections, which include uncertainty, or the development of countervailing powers are necessary conditions for the equalization of resource earnings between agriculture and other sectors of the economy.

SOURCES OF DATA

This paper is a continuation of the work of the Economics Branch of the Canada Department of Agriculture in measuring the productivity of Canadian agriculture. The first report appeared under the title: "An Enquiry into the Relationships Between Changes in Over-all Productivity and Real Net Return per Farm . . . Canadian Agriculture, 1926-1957", by S. H. Lok. The second report was published in the *Canadian Journal of Agricultural Economics*, Vol. XII, No. 2, 1964, under the title: "Productivity of Canadian Agriculture, 1935 to 1960: A Quarter Century of Change", by I. F. Furniss. Other major papers by I. F. Furniss on the subject include: "Productivity Trends in Canadian Agriculture, 1935 to 1964", *Canadian Farm Economics*, Vol. 1, No. 1, April 1966, pp. 18 to 22; "Trends in Agricultural Productivity", *Canadian Farm Economics*, Vol. 2, No. 1, April 1967; and "Productivity Trends in Canadian Agriculture, 1935 to 1965", *Readings in Canadian Geography*, edited by Robert M. Irving, Holt, Rinehart and Winston of Canada, Toronto, 1968, pp. 205 to 215. In addition, reports on this work have been carried in several of the proceedings of the "Canadian Agricultural Outlook Conference". Various notes by I. F. Furniss and other authors have appeared occasionally in the *Canadian Journal of Agricultural Economics*, relative to the problems of measurement of productivity changes in agriculture.

The indexes for Canada of output and of inputs as reported in this paper are aggregations by provinces of the price-deflated output and inputs without adjustments for interprovincial movements. The output index, therefore, differs conceptually in detail from the *Index of Farm Production* published annually by the Farm Finance Section, Agriculture Division, Dominion Bureau of Statistics. Both output indexes, however, are a measure of the total physical volume of output as contrasted with the Index of Real Gross Domestic Product (published by the Industrial Output Section of D.B.S.) which is a measure of value added (net output), and therefore more adapted for measuring trends in labor productivity.

The farm output index as reported in this paper was prepared in the Farm Finance Section, Agriculture Division, Dominion Bureau of Statistics. The statistics employed to calculate the index of production inputs were obtained from published or unpublished (but publishable) statistics generated by the Dominion Bureau of Statistics. One of the largest single sources was the annual estimates of farm operating expenses prepared in the Farm Finance Section of D.B.S. These estimates, when used, were adjusted by the use of appropriate price indexes to constant price values. More details on the index of production inputs as reported in this paper may be obtained by communicating with the author at the Economics Branch, Canada Department of Agriculture, Ottawa.

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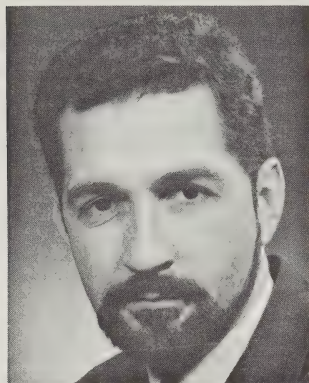
NOTES AND REFERENCES

- (1) For purposes of this analysis, the labor of the farm operator and his family help was valued at hired farm wage rates on the basis of the annual average monthly wage rate without board. No attempt was made to make any valuation (estimate) of the management input as such in agriculture since little or no information is available as to the division of farm operators' time between labor and management or of the opportunity price of management in agriculture. Most agricultural business studies compute management earnings in agriculture as a residual. These earnings usually show considerable variation between years, farm operators and types of farming. The earnings of the capital investment in agriculture (both owned and rented) were valued at the farm mortgage interest rate.
- (2) For aggregative economic statistics, including output, a linear trend of the model $Y = A + BX$, either in natural numbers or logarithms, or the power function of the form $Y = AX^B$, which becomes linear in logarithms, generally provides the best fit (or approximation) of trend for economic time series. The main statistical advantage of the power function is that the curve will exhibit constant elasticity over the range of the data and the curve never reaches a maximum. Thus, when $X = \text{Time}$, measured in years, and $Y = \text{Output}$ measured in constant prices, the estimate of the parameter B , that is b , will be the annual growth rate of output in per cent. This does not imply, however, that a power function of the form $Y = AX^B$ is suitable for describing biological growth curves. Fitting a statistical trend to observed values to eliminate the effects of weather has the main advantage of simplicity. However, it can have the disadvantage of biasing the growth rate estimates if wide deviations from the fitted trend occur for the year-end values. The period 1950 to 1969 did not appear to present a problem in this respect as certain other time periods would have done. For example, in the case of total output, the observed value for 1950 was 109.2 (1949=100) and the predicted value (on the basis of the 20-year trend) was 109.3. For 1969, the observed value was 177.1 and the predicted value was 168.9. However when the time period 1960 to 1969 was considered, the 10-year trend value for total output indicated a predicted value of 130.0 (1949=100) for 1969 (observed value of 133.0) while the predicted value for 1969 was 179.2 (observed value of 177.1). All trends were fitted by the method of ordinary least-squares regression.
- (3) Real estate inputs refer to both owned and rented real estate and include interest on investment in land and buildings, depreciation and repairs on buildings, property taxes and fencing maintenance—all valued at 1949 prices.
- (4) Labor inputs are the sum of the annual average numbers of "own account workers", "employers", "unpaid family workers" and "paid workers", all valued as specified in note (1), regardless of class of worker. For purposes of this study, farm operators are the total of "own account workers" and "employers" in agriculture. The data used are annual averages of 12 monthly sample surveys. See: *The Labour Force*, Cat. No. 71-001, Monthly, Dominion Bureau of Statistics, Ottawa.

- (5) Heady, E. O. and L. G. Tweeten, *Resource Demand and Structure of the (United States) Agricultural Industry*, Iowa State University Press, Ames, 1963, Ch. 9.
- (6) *The Labour Force*, Cat. No. 71-001, Monthly, Table 6, Dominion Bureau of Statistics.
- (7) Farm machinery inputs include interest on machinery investment, depreciation, repairs, fuel, oil, lubricants and other operating expenses—all valued at 1949 prices.
- (8) Feed and seed inputs refer to inputs of feed, seed and nursery stock purchased by farmers from nonfarm sources, valued at 1949 prices. Conceptually, the farm value of the raw materials included in purchased feed, seed and nursery stock should be excluded but current statistical sources prevent a meaningful adjustment to the data along these lines. The effect on the index itself likely would not be significant but, in attempting to determine the share of inputs in the form of feed, seed and nursery stock as a proportion of total inputs, the present data overstate this share to some extent. Conceptually, the farm share of this group of inputs should be excluded since the farm costs of producing feed, seed and nursery stock are accounted for through the charges for farm real estate, labor and other inputs. There is also a problem of the time lag involved since purchased feed and seed inputs consumed in the current year contain farm-produced materials of the previous year.
- (9) Unless otherwise stated, the index of fertilizer and limestone refers to total consumption of commercial fertilizers, both fertilizer materials and mixed fertilizers, together with agricultural lime and limestone (including marl). The index largely reflects fertilizer consumption trends. Consumption of *agricultural lime* in Canada in the last half of the 1960's was at about the same level as in the first half of the 1950's. During the intervening years, consumption dropped to as low as a fifth of the consumption in the other years. Consumption of *limestone for agricultural use* has been rising and, in the first half of the 1960's, was almost double the amount consumed in the previous five-year period.
- (10) "Other Inputs", for purposes of this analysis, purports to include, unless otherwise stated, interest on investment in livestock and poultry, interest on investment in purchased feeder livestock (purchased through commercial channels, that is, excluding interfarm sales and transfers), livestock services (A.I. fees, breed association fees, veterinary services and supplies), hired custom work by nonfarm operators, electricity, telephone, insurance, pesticides (including herbicides), containers, twine, irrigation water levies and, finally, a "miscellaneous" grouping intended to account for tools, small hardware, etc.—all valued at 1949 prices. The "Other Inputs" grouping, it will be recognized, contains many of the specialized farm capital inputs which either tend to increase rapidly in use or to disappear over time.
- (11) Purchased inputs include the interest on investment in rented real estate; depreciation on rented buildings; all building repairs (rented or owned); all property taxes (on rented or owned real estate); hired labor; machinery repairs and operating inputs; interest on purchased feeder livestock; purchased feed, seed and nursery stock; fertilizers; limestone; pesticides; hired custom work; and all other purchased (from the nonfarm sector) goods and services. Non-purchased inputs represent the interest on investment in owned real estate, livestock and machinery of the farm operator (proprietor), together with his labor and that of his family (where applicable). Non-purchased inputs also include the depreciation on owned buildings and machinery. All inputs, purchased and non-purchased, were valued at 1949 prices.
- (12) B. N. Smallman, et. al., Background Study for the Science Council of Canada, 1970 Special Study No. 10, *Agricultural Science in Canada*, Cat. No. 5521-1/10, Queen's Printer, Ottawa, 1970, Table 1, p. 38.
- (13) *Federal Government Expenditures on Scientific Activities*, Cat. No. 13-401, Biennial, Dominion Bureau of Statistics, February 1969, Table 2, p. 25. The figure cited refers to expenditures classified as research and development, scientific data collection and scientific information dissemination. It does not include federal capital investment expenditures for scientific activities.
- (14) *Canadian Agriculture in the Seventies*, Report of the Federal Task Force on Agriculture, December 1969, Cat. No. A21-15, Queen's Printer, Ottawa, 1970, pp. 276 to 277.
- (15) An "improved" crop variety is one which yields a greater output (all other resources held constant) than previously grown crop varieties. In livestock production, improvements are associated, for example, with greater output of livestock and livestock products per pound of feed input—all other inputs constant. Likewise, machinery improvements are said to occur when one man is enabled to plant and harvest a greater volume of product than previously, or when time lost from machinery breakdowns is reduced, or when an improved machine enables an increased rate of operation so as to take advantage of favorable harvesting weather thus reducing the value of crop losses to weather by more than the additional costs of the higher speed of operation.
- (16) This discussion is based upon several published sources which treat the subject in more detail than is possible here. The references consulted include:
 - (a) Peterson, W. L., *The Returns to Investment in Agricultural Research in the United States*, Staff Paper P69-5, April 1969, Department of Agricultural Economics, University of Minnesota.
 - (b) *Farmers in the Market Economy*, Iowa State University Press, Ames, Iowa, 1964, Ch. 8.
 - (c) Heady, E. O., *Agricultural Policy Under Economic Development*, Iowa State University Press, Ames, Iowa, 1962, Ch. 4.
- (17) A more detailed discussion will be found in Study No. 3 of the Royal Commission on Farm Machinery by C. J. Maule entitled: *Productivity in the Farm Machinery Industry*, Ch. 2, "Labour Productivity—Meaning and Measurement", pp. 5 to 13, published by the Queen's Printer, Cat. No. Z1-1966/4-3, Ottawa, 1969. This reference deals with the inherent conceptual and statistical problems in making interindustry and intercountry comparisons of labor productivity.

THE TREND PATTERN OF BUTTER CONSUMPTION IN CANADA

J. L. Pando



"Changes in consumers' tastes and preferences are considered to be the most important factors in the declining consumption of butter..."

"Total consumption has followed an upward trend but this is not expected to continue..."

The per capita consumption of butter in Canada has been declining since World War II. From 1949 to 1968, the level of consumption, on a per capita basis, dropped from 23.5 pounds to 16.5 pounds. This reduction in consumption was not, however, the result of a continuous decline: the pattern showed many ups and downs during this period. These fluctuations have made the task of predicting a future trend more difficult.

The main purpose of this paper is to show that those "ups and downs" were the result of accidental or transitory factors and that the "unaffected" pattern of consumption, with the removal of those factors, would be a relatively smooth declining trend.

There are several explanations of the decreasing trend in the per capita consumption of butter. A study by the Economics Branch, Canada Department of Agriculture suggests that the downward trend "results from the interaction of a rather complex set of forces, but the trend away from animal fats and the price advantages of competing products appear to be influential" (1). A study done for the Task Force suggests that changes in consumer tastes and preferences play an important role in the present trend (2). This study says that "the case of margarine shows that a taste for substitutes can be acquired, especially in childhood". This point is substantiated by the results of a consumer survey conducted in Canada in 1969 (3). According to this survey, the percentage of households purchasing butter decreased substantially from 1954 to 1969. Most of this decline occurred in new households, which shows that the

younger generation is less inclined to consume butter than the older one. Because margarine was first introduced in Canada in 1949, it can be assumed that persons forming these new households were educated in their childhood to consume margarine. The survey also pointed out some other factors which could influence butter consumption, such as income distribution, percentages of wives working outside their homes, ethnic factors, etc. In the U.S., where the declining trend in butter consumption is even stronger than in Canada, price competition from competing products, and diet and health reasons are considered the main factors responsible for this trend (4). One conclusion that can be drawn from these studies is that there has been a shift in consumers' preferences from butter to other commodities in the fats and oils group. This point is substantiated by the fact that since 1949, the reduction in the consumption of butter has been accompanied by an increase in the consumption of fats and oils as a whole; that is, the decline in butter consumption in Canada has been more than offset by the increase in the consumption of other commodities within the fats and oils group, particularly shortening and margarine (Figure 1). A similar trend was apparent in the U.S., although there the decline in butter consumption was even larger.

The motivating forces behind this shift in consumer preference are not easily explained. Although the relative prices of butter and the competitive products have some influence, these do not wholly account for the magnitude of the substitutions. For

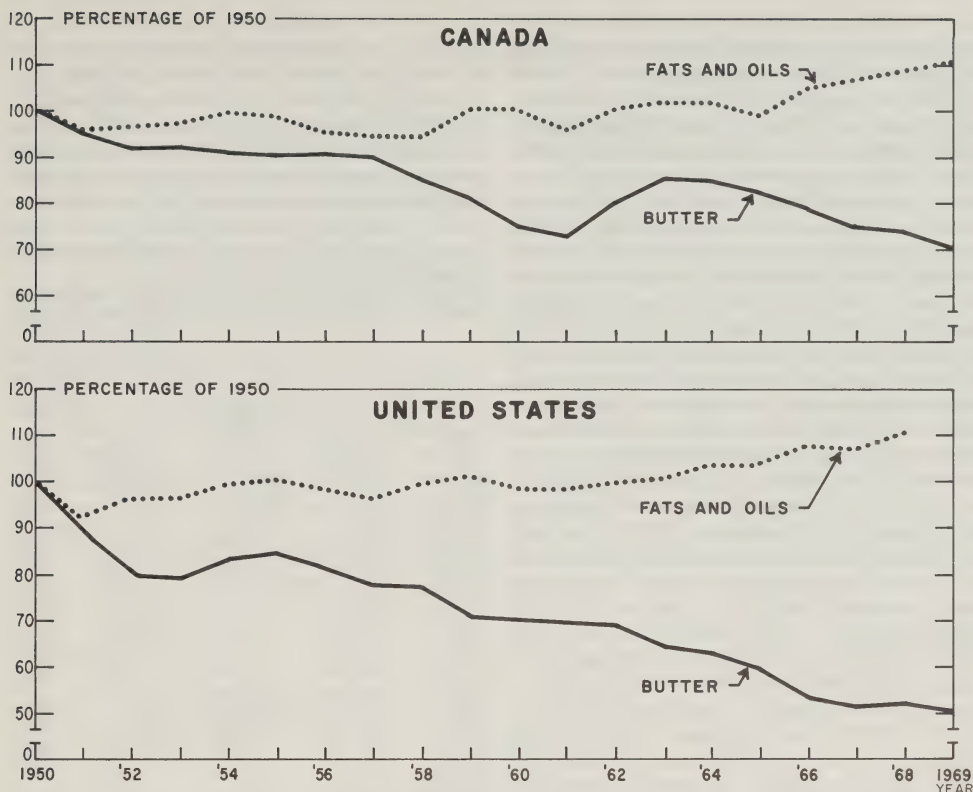


FIGURE 1. PER CAPITA CONSUMPTION OF BUTTER AND FATS AND OILS AS A PERCENTAGE OF 1950 CONSUMPTION, CANADA AND UNITED STATES 1950 TO 1969.

example, price, income and cross-elasticities were obtained in this study by means of a model of two equations based on the *Conceptual Model of Brandow* (5) and the *Demand Model for Dairy Production of Rojko* (6). In this model, the dependent variables are per capita consumption of butter and margarine respectively and the independent or explanatory variables are the retail price of butter, the retail price of margarine and per capita personal disposable income (7, *Model I*). The period studied was 1950 to 1968. The prices and income were deflated on the basis of 1957 indexes. Since the data were transformed into logarithms, the coefficients of the variables represent conventional elasticities; that is, the coefficients show the percentage changes in quantities resulting from one per cent changes in prices and income. It can be observed from Equation 1 (*Model I*) that the cross-elasticity between butter and margarine is only .204; that is, a one per cent reduction in the price of margarine reduced the consumption of butter by .2 per cent. Furthermore,

the variable price of margarine is the least representative in the equation since it produces the smallest reduction in residual variance. To show that the substitution between these two commodities is not a matter of price differentials alone, a second model was formulated. In this second model, price of the competitive commodity (margarine) was replaced by the quantity of margarine consumed per capita (7, *Model II*). It can be observed from this second model that a one per cent increase in margarine consumption is followed by a .57 per cent decrease in butter consumption; or expressing it in terms of margarine, (7, *Model II, Equation 2*) a one per cent reduction in the consumption of butter was followed by an increase of .9 per cent in the consumption of margarine. The multiple correlation coefficients for both equations are substantially greater in the second model than in the first model. The results of these two models suggest that, independent of price differentials, the consumer attaches more utility to margarine than to butter.

The conclusion that the trend in butter consumption is not the consequence of pecuniary factors alone can be further substantiated if the influence of income on the consumption of butter is considered. The income elasticity of butter, from the Model I, equals $-.788$. In Model II, this income elasticity is $-.524$. Model I represents the conventional relationships between variables and the majority of economists estimate the income elasticities from similar models. The value of the first elasticity is very similar to those developed by others. Yankowsky's income elasticity for butter is estimated at $-.8$ (1) and the Perkins' report (2) gives an income elasticity equal to $-.751$. The small differences between these three elasticities can be explained by the different time periods and degree of identification used by each author.

The negative sign of the income elasticity means that the consumption of butter in Canada declines as per capita disposable income rises. This, however, does not mean that butter has become an inferior good in Canada. On the contrary, the 1969 consumer survey organized by the Canadian Dairy Commission (3) shows that those consumers who use more than average amounts of butter are found among private home owners in the higher income groups. In the U.S., where the declining trend in the per capita consumption of butter is even steeper than in Canada, the results of the Household Food Consumption Survey of 1965-66 in the Northeastern United States show that the consumption of butter increases with income (8). For example, the average weekly per capita butter consumption rose from .148 pounds for persons with less than \$6,000 net income to .298 pounds for persons with more than \$15,000 net income. The conclusion of all this is that although butter remains a superior good on an individual basis, in the aggregate, the per capita consumption of butter, as an index of the whole market, behaves as an inferior good. The negative income elasticity of butter, based on time series data, means that the population as a whole shows a trend away from butter or that the number of butter consumers is declining; and is an indication that this declining trend is not the direct consequence of higher per capita incomes in the country, but rather a simultaneous phenomenon which could perhaps be associated with affluency.

The explanation of the reasons for the changes in consumers' utility is beyond the scope of this paper. This analysis starts by accepting the fact of a declining trend in the per capita consumption of butter and its apparent irreversible nature.

The purpose of this analysis is to explain how the economic conditions during the 1950-69 period influenced the trend in the per capita consumption of butter during that period. To do this, the "transitory

factors" in the economy that affected butter consumption were identified and their influence removed. After the removal of these factors, weighted data were developed which, in turn, were used to build a trend line. Although behaviouristic analysis was not attempted, mention is made of some of the quantifiable factors which have had an influence on the past trend and may have an influence in the future.

TABLE 1—PRODUCTION AND CONSUMPTION OF CREAMERY BUTTER IN CANADA

Year	Production	Consumption	Production Less Consumption	Consumption as a Percentage of Production
	thousand pounds			per cent
1949	279,805	261,186	18,619	93.3
1950	261,464	276,671	-15,207	105.8
1951	257,165	268,542	-11,377	104.4
1952	280,746	274,911	5,835	97.9
1953	302,783	285,723	17,060	94.4
Average 1949-53	276,393	273,407	2,986	98.9
1954	313,230	293,292	19,938	93.6
1955	318,577	301,645	16,932	94.7
1956	303,314	313,606	-10,292	103.4
1957	303,371	321,554	-18,183	106.0
1958	335,990	312,255	23,735	92.9
Average 1954-58	314,896	308,470	6,426	98.0
1959	325,578	303,059	22,519	93.1
1960	320,403	289,889	30,514	90.5
1961	352,133	288,309	63,824	81.9
1962	361,720	320,752	40,968	88.7
1963	351,919	351,342	577	99.8
Average 1959-63	342,351	310,670	31,681	90.7
1964	351,742	357,323	- 5,581	101.6
1965	337,381	356,201	-18,820	105.6
1966	333,906	347,819	-13,913	104.2
1967	329,899	336,982	- 7,083	102.1
1968	335,896	333,110	2,786	93.6
Average 1964-68	337,765	346,287	- 8,522	102.5
1969	349,845	322,307	27,538	92.1

Source: *Dairy Statistics*, Cat. No. 23-201, Dominion Bureau of Statistics.

One of the principal uses for the results of this analysis is to provide some information about the amount of butter that the domestic market could absorb in the future. It can be seen, in Table 1, that, during the 1949-69 period, the consumption and production of creamery butter (9) were never in balance: in some years, production was greater than consumption and in others, consumption was greater. These irregularities led to either the need to import butter for domestic requirements or to the abnormal accumulation of stocks. If information about expected consumption rates were available, this situation could be remedied. Therefore, the last part of this paper gives projections of per capita consumption for 1975 and 1980.

TREND DETERMINATION

In determining the trend line of the per capita consumption of butter, the time period selected is very important. For example, if the determination were based on the time period 1963 to 1968, the resulting trend line would be much steeper than a trend line based on the 1950-69 period, leading to an underestimation of future consumption. However, if the analysis were based on a wider range of observations, a much better explanation of the trend could be obtained. The present analysis is based on the time period 1950 to 1969.

The graphic representation of the observations for the period 1950 to 1969 (Figure 2) shows that the consumption of butter in Canada followed four distinctively different patterns. The first pattern, which correspond the period 1950 to 1958, was a smooth, slowly declining trend. The second pattern was observed in the 1958-61 period in which there was an abrupt decline in the consumption. The third pattern lasted only two years, from 1961 to 1963, and it showed a rapid recovery in consumption to the level

of 1958. The last pattern, a sharp decrease in consumption, occurred in period 1963 to 1968.

Two significant factors appear to be mainly responsible for the irregularity in consumption 1958 to 1966: 1) the high rate of unemployment that characterized the 1958-63 period; and 2) the subsidy, established by the government of Canada from mid-1962 to early 1966, which had the effect of reducing butter prices to the consumer.

These two factors are considered transitory, therefore, to develop a trend line based on the normal or natural behaviour of the market, the influence of these factors must be removed from the data. To do this certain assumptions must first be made. The first of these assumptions concerns the rate of unemployment. Usually four per cent unemployment is considered full employment (10); however, in this analysis, it was assumed that the rate of unemployment had an influence on consumption only when it was higher than five per cent. To quantify the influence of this high rate of unemployment, the combined influence of the past, present and expected unemployment rates must be taken into consideration. The

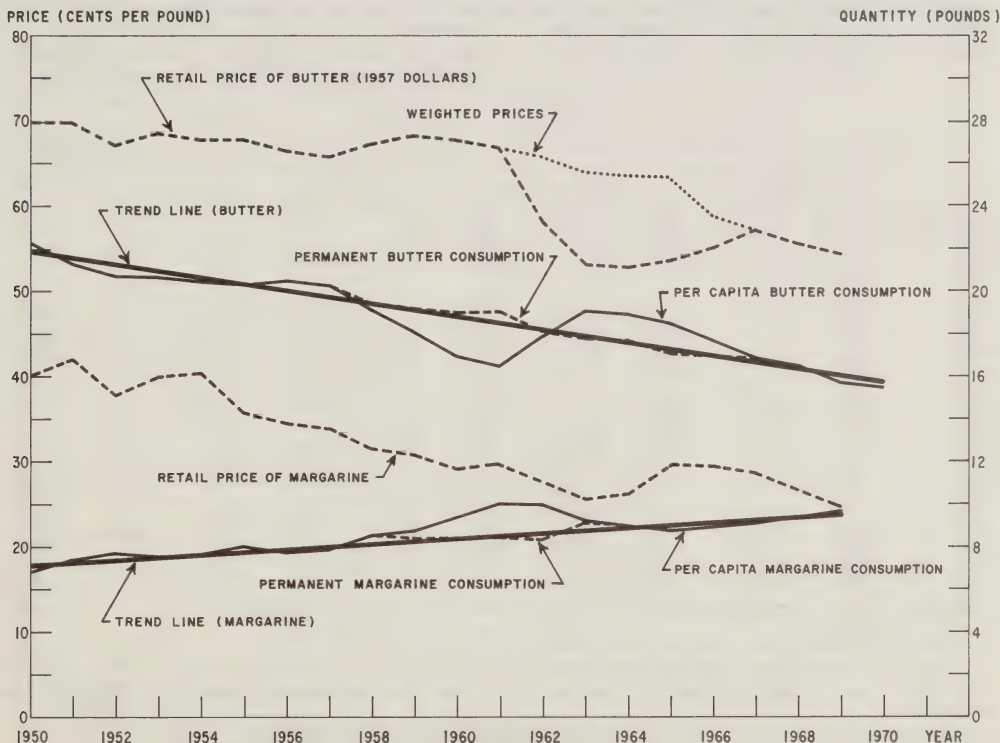


FIGURE 2. PRICES AND CONSUMPTION OF BUTTER AND MARGARINE AND PERMANENT CONSUMPTION, CANADA 1950 TO 1969.

reasoning behind this is based on the difference in the psychological influence on the consumer of an isolated period of high unemployment and of a case in which this high rate of unemployment is part of a prolonged occurrence. It has been assumed that, when the national economy suffers a recessive process, an individual is already committed to some personal credits; in other words, he has already spent part of his expected income. Under these circumstances, the consumer's budget adjustment is obtained from the most flexible part of that budget, which is often the food expenditure portion. The individual food consumption pattern, therefore, is shifted to cheaper substitute goods. This adjustment process increases, the longer the recession period lasts. In Figure 2, it can be seen that the abrupt decline in butter consumption from 1958 to 1961 was followed by a corresponding increase in margarine consumption during that period.

In this analysis, the weighted rate of unemployment for a particular year was obtained by the combined influence of the actual rate of unemployment in that year, the actual rate of unemployment in the previous

year, and the expected rate of unemployment for the subsequent year. The influence, on the consumer of each of these three rates of unemployment, at any particular point of time, are not equal. The present unemployment rate has the strongest influence of all, but the unemployment rate in the previous year weighs more strongly than the expected unemployment rate for the next year. To quantify the impact of these three rates of unemployment on the consumption of butter in a particular year, several sets of three coefficients of the rates of unemployment were tested. The best results, in terms of correlation with butter consumption, were obtained with the following set of coefficients: $t-1=.4$, $t=.5$ and $t+1=.1$ where t stands for the particular year under analysis. For example, if the year under analysis were 1961, the weighted unemployment rate for that year would be 6.9 ; that is 7 (1960 rate) $\times .4 + 7.1$ (1961 rate) $\times .5 + 5.9$ (1962 rate) $\times .1 = 6.9$ (Table 2). Every actual rate of unemployment that was less than five per cent was given the value of four per cent for purposes of computation.

TABLE 2—FACTORS AFFECTING THE CONSUMPTION OF BUTTER, CANADA, 1950 TO 1969

Year	Retail Price of Butter ^a		Retail Price of Margarine ^a		Per Capita Expenditure on Food ^a		Personal Disposable Income ^a		Unemployment Rate	
	Current	Constant ^b (1957 = 100)	Current	Constant ^b (1957 = 100)	Current	Constant ^c (1957 = 100)	Current	Constant ^c (1957 = 100)	Actual	Weighted
	cents per pound				dollars				per cent	
1950	60.3	69.7	34.7	40.1	229	259	925	1,096	3.6	4.0
1951	67.8	68.8	41.4	42.0	258	224	1,056	1,132	2.4	4.0
1952	66.2	67.2	37.1	37.7	263	228	1,112	1,163	2.9	4.0
1953	65.0	68.5	38.0	40.0	262	245	1,139	1,203	3.0	4.0
1954	64.0	67.7	37.9	40.1	264	249	1,111	1,166	4.6	4.0
1955	64.1	67.8	33.7	35.7	270	286	1,168	1,223	4.4	4.0
1956	63.5	66.4	33.1	34.6	284	296	1,259	1,299	3.4	4.0
1957	65.7	65.7	33.9	33.9	298	298	1,281	1,281	4.6	4.0
1958	69.2	67.2	32.5	31.6	307	296	1,340	1,306	7.0	5.9
1959	69.6	68.2	31.3	30.7	313	304	1,370	1,320	6.0	6.5
1960	69.8	67.8	30.0	29.1	320	310	1,403	1,335	7.0	6.6
1961	69.9	66.9	31.0	29.7	320	307	1,426	1,345	7.1	6.9
1962	62.1	58.4	29.6	27.8	329	310	1,521	1,418	5.9	6.3
1963	58.5	53.2	28.0	25.5	339	310	1,586	1,452	5.5	5.6
1964	58.9	52.8	29.3	26.3	349	314	1,645	1,481	4.7	4.0
1965	61.4	53.6	33.9	29.6	362	318	1,789	1,571	3.9	4.0
1966	67.1	55.1	36.0	29.6	381	315	1,928	1,633	3.6	4.0
1967	70.4	57.1	35.4	38.7	396	327	2,044	1,670	4.1	4.0
1968	70.9	55.6	33.9	26.6	409	327	2,236	1,787	4.8	4.0
1969	72.2	54.3	32.7	24.6	n.a	n.a	2,398	1,843	4.7	4.0

n.a. = not available.

^a Prices, income and expenditure are in 1957 dollars.

^b The deflators for prices were the Food Price Indexes.

^c The deflators for income and expenditure were the Implicit Price Indexes for Personal Expenditure on Consumer Goods and Services.

Sources: (1) *Prices and Price Indexes*, Cat. No. 62-002, Dominion Bureau of Statistics.

(2) *National Accounts, Income and Expenditure*, Cat. No. 13-201, Dominion Bureau of Statistics.

(3) *Statistical Review*, Cat. No. 11-003, Dominion Bureau of Statistics.

The second factor considered was the price subsidy in effect from 1962 to 1966. It was found that the price elasticity of demand for butter for the period 1962 to 1966 was equal to $-.86$. This means that a 10 per cent reduction in retail butter prices was followed by an increase of 8.6 per cent in consumption. For example, if an individual will consume 18 pounds of butter when the price of butter is 60 cents a pound, it is expected that his consumption would increase to 19.5 pounds if the price were 58 cents a pound. This was the demand elasticity ($-.86$) only during the period 1962 to 1966. The demand elasticity of the overall period (1950 to 1969) was only $-.69$. An elasticity of this magnitude indicates that a large price reduction would be needed before consumption would increase significantly. Even during the 1962-66 period, the influence of the price reduction was diminished over time.

The next step of the analysis was to develop an econometric model to explain the fluctuations that occurred in the per capita consumption of butter, as a function of some other variables. This model is called an explanatory model and its function is to generate the "permanent" data (11) of butter consumption by giving certain values to some of the explanatory variables (12). The explanatory variables included in this model are: the retail price of butter, the retail price of margarine, the per capita expenditure on

food, the per capita disposable income, and the unemployment rate. These five variables were selected after careful testing of many factors (13). The data used for obtaining the model were those shown in Table 2. The prices for butter and margarine were expressed in 1957 constant dollars. Per capita expenditure on food and per capita disposable income were also expressed in 1957 dollars.

The resulting equation showed that the most representative variables were the retail price of butter, the per capita disposable income and the unemployment rate. The equation is very representative as the variables selected explain almost 93 per cent of the fluctuations in per capita butter consumption.

The "permanent" butter consumption data for the 1958-66 period were obtained by replacing, in the explanatory model, the actual values of the variables, "price of butter" and "unemployment rate", with the weighted values (Table 3) of these variables. For example, for the period 1958 to 1963, all the observations of the variable "unemployment rate" were given a value of "four". For the period 1962 to 1966, the values used for the variable "retail price of butter" were those obtained from deflating the current prices, after removal of the effect of the price subsidy, by the consumer price index. The resulting weighted data for per capita consumption of butter are shown in Table 3.

TABLE 3—BUTTER: ACTUAL AND WEIGHTED PER CAPITA CONSUMPTION, CANADA, 1950 TO 1970

Year	Actual consumption	Retail price of butter			Unemployment rate		
		Current (1957 = 100)	Constant	Weighted Constant	Actual	Weighted	Weighted consumption
	pounds	cents per pound			per cent		pounds
1950	22.33	60.3	69.7	69.7	3.6	4.00	22.33
1951	21.22	67.8	68.8	68.8	2.4	4.00	21.22
1952	20.69	66.2	67.2	67.2	2.9	4.00	20.69
1953	20.65	65.0	68.5	68.5	3.0	4.00	20.65
1954	20.40	64.0	67.7	67.7	4.6	4.00	20.40
1955	20.27	64.1	67.8	67.8	4.4	4.00	20.27
1956	20.51	63.5	66.4	66.4	3.4	4.00	20.51
1957	20.26	65.7	65.7	65.7	4.6	4.00	20.26
1958	19.11	69.2	67.2	67.2	7.0	5.94	19.48
1959	18.11	69.6	68.2	68.2	6.0	6.50	19.19
1960	16.95	69.8	67.8	67.8	7.0	6.61	19.00
1961	16.49	69.9	66.9	66.9	7.1	6.94	19.04
1962	17.89	62.1	58.4	65.9	5.9	6.34	18.15
1963	19.11	58.5	53.2	64.1	5.5	5.58	17.78
1964	18.98	58.9	52.8	63.6	4.7	4.00	17.67
1965	18.52	61.4	53.6	63.2	3.9	4.00	17.04
1966	17.76	67.1	55.1	58.8	3.6	4.00	16.94
1967	16.90	70.4	57.1	57.1	4.1	4.00	16.90
1968	16.50	70.9	55.6	55.6	4.8	4.00	16.50
1969	15.70	72.2	54.3	54.3	4.7	4.00	15.70
1970	15.50	n.a.	n.a.	n.a.	5.9	5.43	15.78

n.a. = not available.

* Forecast.

Sources: (1) *Dairy Statistics*, Cat. No. 23-201, Dominion Bureau of Statistics.
 (2) *Prices and Price Indexes*, Cat. No. 62-002, Dominion Bureau of Statistics.
 (3) *Statistical Review*, Cat. No. 11-003, Dominion Bureau of Statistics.

It was found, however, that in the explanatory model, the dependent variable showed a standard deviation equivalent to .533 pounds of butter. This means that the per capita consumption of butter computed from the model showed a standard deviation of .533 from the actual values. By correcting the computed values of the consumption of butter in the 1958-66 period, by the values (plus and minus) of the standard deviations, three sets of data were obtained. From these data, the following trend lines were developed:

$$1) Y_1 = 22.166 - .3028 t \\ R^2 = .969$$

$$2) Y_1 - \sigma = 22.152 - .327 t \\ R^2 = .966$$

$$3) Y_1 + \sigma = 22.241 - .285 t \\ R^2 = .978$$

Where Y_1 = per capita consumption of butter

$Y_1 - \sigma$ = Y_1 minus one standard deviation

$Y_1 + \sigma$ = Y_1 plus one standard deviation

t = time (1950 = 1)

The first equation, with the other two acting as stabilizers, was used to derive the trend line. The trend line obtained is downward sloping, but with a slow rate of decline. The average annual rate of decline for the period 1950 to 1969 was 1.54 per cent and the coefficient of variability was only 1.68

per cent around that trend (14.) This means that the observations fluctuated very little from the trend line and that the decline in per capita consumption every year was very close to 1.54 per cent of the previous year's consumption level (Figure 3).

If no "transitory factors" affect consumption in the future, it can be assumed that this trend will continue. If some disturbances in the market are foreseen, the proper corrections of the projected consumption would have to be made. For example, the per capita butter consumption for 1970, under normal circumstances, is estimated to be 15.78 pounds. However, the rate of unemployment for 1970 is estimated to be 5.9 per cent, which is a substantial increase from the 1969 rate of 4.7 per cent. If the unemployment rate is estimated to continue at about six per cent through 1971, the "corrected" consumption estimate for 1970 would be 15.5 pounds per capita.

In this analysis of the trend of butter consumption, some consideration should be given to the changes that occurred in the price, income and cross-elasticities with the introduction of modifications in the data. When the actual data in the earlier models (7) were replaced with the "permanent" data, new elasticities were obtained (15). The main feature of this substitution was the improvement in the value of the multiple correlation coefficients for all the equations and hence, the great reduction in residual

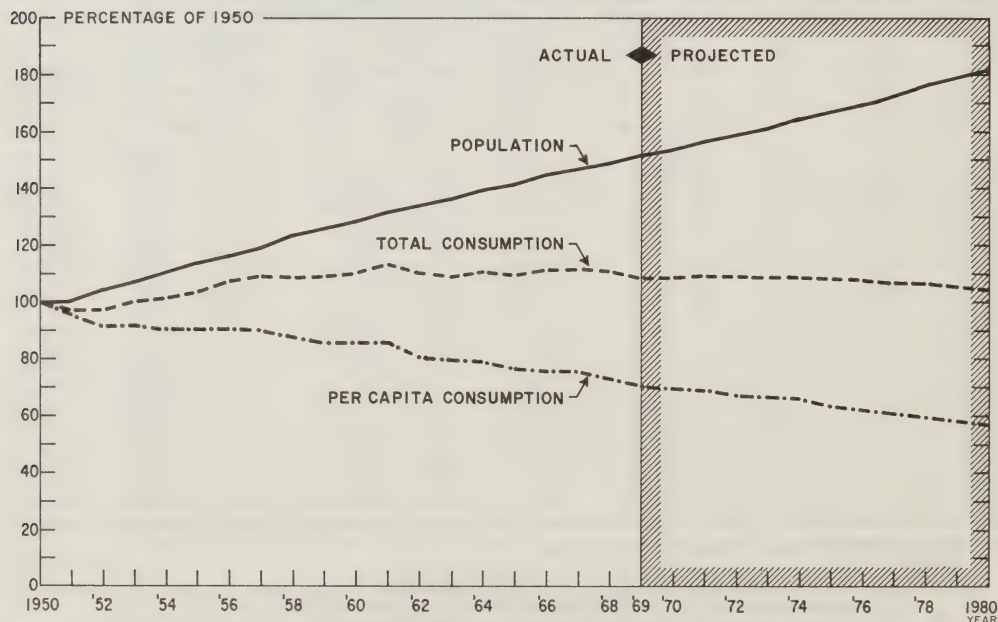


FIGURE 3. TREND IN BUTTER CONSUMPTION, AS PERCENTAGE OF 1950, CANADA 1950 TO 1969 AND PROJECTIONS TO 1980.

variances. The coefficients of all the variables in both models, with the exception of the income elasticity for margarine (15, *Model I, Equation 2*), were reduced substantially. In *Model I, Equation 1*, the greatest reduction was in the cross-elasticity between butter and margarine which had the almost negligible value of .0347 when the "permanent" data were used, compared with the previous value of .204. The second greatest reduction was in the price elasticity of butter which was only $-.19$ compared with the previous value of $-.69$. These two reductions in price elasticities reinforce the previously stated theory that the demand for butter is not basically determined by price differentials. One very interesting change obtained from using the "permanent" data in *Model I* was the new value of the income elasticity for butter. The original income elasticity developed in this study (7) was equal to $-.788$. This value for the income elasticity coincided with those given by other studies (1) (2). The new income elasticity, however, was $-.68$, a value which can be considered more truly representative, since it was obtained from data free from the influence of transitory disturbances.

FUTURE TRENDS

Although the per capita consumption of butter decreased at the rate of 1.54 per cent a year from 1950 to 1969, total consumption showed an upward trend during that period because the decline in per capita consumption was more than offset by the increase in the population of the country. From 1949 to 1968 the population of Canada increased at an average annual rate of 2.41 per cent. However, during the last few years, the annual rate of increase has been substantially smaller. According to a recent study by the Census Division of the Dominion Bureau of Statistics (16), Canada's population at June 1, 1975 is expected to be 23,154,400 persons. This projection represents an annual rate of increase of 1.6 per cent from 1970. The same study estimates that the population will be 25,210,300 persons in 1980, an average annual increase of 1.7 per cent from 1975.

If the trend in per capita butter consumption developed in this paper were projected to 1980, the annual rate of decrease in per capita consumption from 1950 to 1980 would average 1.8 per cent, a substantially larger rate of decline than the 1.54 per cent calculated for the 1950-69 period.

As a result of the decreasing rate of population growth and the decreasing rate of per capita butter consumption, total butter consumption will decrease. Using the projected rates of decrease de-

scribed above, total butter consumption is expected to decline by .53 per cent a year from 1970 to 1975, and by .62 per cent a year from 1975 to 1980.

These trends are based on the assumption that the same forces that affected consumption in the past will continue to operate. However, this is not necessarily true, since there are probable developments in the economy in the next 10 years which could have a tremendous impact on consumer behaviour. The dairy industry of Canada is already conducting an intensive promotional campaign for dairy products and the Canadian Dairy Commission is setting up a research committee to look at the possibilities of developing new products which would increase consumption of dairy products (17). Developments such as these could alter this apparently chronic declining trend in butter consumption.

Excluding the effect of such developments, the projections for 1975 and 1980 derived from this analysis can be summarized as follows:

1) for 1975, the per capita consumption of butter is estimated at 14.22 pounds and total consumption at 329.3 million pounds;

2) for 1980, the projected per capita consumption is 12.7 pounds which will represent a total consumption of 320.2 million pounds.

These projections differ slightly from those developed by Yankowsky (1) and Perkins (2). Both authors estimate the per capita consumption of butter for 1975 at 14 pounds. Yankowsky's projection for 1980 is 13 pounds and Perkins' is 13.1 pounds. The differences between the projections in this paper and those given by Yankowsky and Perkins could be explained by the fact that these authors emphasized the influence of income and price differentials; whereas, this study tried to prove that changes in consumer tastes and preferences play a more important role in the consumption of butter than prices. Income elasticity, on the other hand, was overestimated by those authors (relative to the elasticities used in this paper) which in turn produced an overestimation of consumption when this consumption was based on projected income. The largest disparity between the present projections and those of Yankowsky and Perkins is, however, in terms of the total consumption of butter. The total consumption projections in this paper were obtained by multiplying the per capita consumption of butter for 1975 and 1980 by the corresponding projected population of Canada as estimated by the Census Division of the Dominion Bureau of Statistics (16). These population projections of 23,154,000 persons for 1975 and 25,210,000 persons for 1980 were based on the assumptions of medium fertility and a net immigration of 100,000 persons a year. Yankowsky

and Perkins, on the other hand, developed their projected total consumption of butter on the basis of population figures of 23,714,000 persons for 1975 and 26,077,000 persons for 1980; that is, those based on the assumptions of high fertility and a net immigration of 140,000 persons a year. These latter assumptions seem to be unrealistic at this point in time, as the demographic changes that have been occurring recently indicate a slower rate of population growth than was formerly expected. Although the per capita consumption projections by Yankowsky and Perkins could be accepted, with some limitations, their total consumption projections appear, in the opinion of this author, to be overestimated by at least three million pounds for 1975 and about 12 million pounds for 1980.

SUMMARY AND CONCLUSIONS

The per capita consumption of butter in Canada has been declining since World War II. This decline was caused by the interaction of a complex set of factors but changes in consumers' tastes and preferences were considered the most important.

This analysis has attempted to show that a high rate of unemployment and the subsidy on butter were the two "transitory" factors that altered the trend of per capita consumption of butter during the period 1958 to 1966. By removing the influence of these two factors from the actual pattern of consumption, "permanent" data were generated. These "permanent" data produced, in turn, new values for price, income and cross-elasticities of butter, and were used to build the "unaffected" trend line. The new elasticities thus obtained were as follows: Price elasticity, $-.189$; income elasticity, $-.68$; cross-elasticity, $.035$. The new trend line was smooth and showed a mild annual rate of decline equal to 1.54 per cent. As a consequence of these improvements in the data and the fact that in this analysis, less emphasis was placed on pecuniary factors and more on consumer changes in taste and preferences, the projections for butter consumption produced in this paper differ from those developed in previous studies.

Although per capita consumption of butter followed a downward trend in the 1950-70 period, total consumption followed an upward trend, because the decline in per capita consumption has been more than offset by the increase in the population of the country. This offsetting process, however, will not continue in the future as the rate of population increase will be smaller than the rate of increase during the past 20 years; whereas, the rate of decrease in the per capita consumption of butter will be substantially larger than in the past.

This present study predicts that, in 1975, the per capita consumption of butter will be 14.22 pounds and total consumption, 329.3 million pounds. For 1980, the per capita consumption will be 12.7 pounds which will represent a total consumption of 320.2 million pounds.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the assistance of Mr. P. E. Whiting who collected and assembled much of the data used in this article.

NOTES AND REFERENCES

- (1) Yankowsky, Z., "Agricultural Demand and Supply Projections for 1980", *Canadian Farm Economics*, Vol. 3, No. 6, February 1969.
- (2) B. Perkins *et al.*, "Canadian Dairy Policies", a research report for the Federal Task Force on Agriculture, January 1969.
- (3) *Butter Demand*, Canadian Dairy Commission, May 1970.
- (4) Culber, D. W. and J. C. Chai, "A View of Food and Agriculture in 1980", *Agricultural Economics Research*, Vol. 22, No. 3, Economic Research Service, United States Department of Agriculture, July 1970.
- (5) Brandow, G. E., *Interrelations among Demands for Farm Products and Implications for Control of Market Supply*, Bulletin 680, Pennsylvania State University, College of Agriculture, Agricultural Experiment Station, August 1961.
- (6) Rojko, A. S., *The Demand and Price Structure for Dairy Products*, Technical Bulletin No. 1168, United States Department of Agriculture, May 1957.
- (7) The price, income and cross-elasticity were obtained from the following model:

MODEL I

Equation 1

$$\log q_b = 4.68 - .6912 \log p_b + .2043 \log p_m - .7884 \log y$$

(.1708) (.0813) (.1243)

$$R^2 = .858$$

Equation 2

$$\log q_m = .4872 + .3673 \log p_b - .4113 \log p_m + .4392 \log y$$

(.2459) (.1170) (.1790)

$$R^2 = .766$$

Where q_b = per capita consumption of butter
 q_m = per capita consumption of margarine
 p_b = retail price of butter (1957 dollars)
 p_m = retail price of margarine (1957 dollars)
 y = per capita personal disposable income (1957 dollars)

In an attempt to explain the shift in preference from butter to margarine, which cannot be sufficiently explained by means of pricing mechanism, a second model was tried which correlates the quantities of the commodities.

MODEL II

Equation 1

$$\log q_b = 4.3387 - .4971 \log p_b - .5671 \log q_m - .5244 \log y$$

(.06032) (.0668) (.0774)

$$R^2 = .97$$

Equation 2

$$\log q_m = 2.9149 - .9052 \log q_b - .2551 \log p_m - .1424 \log y$$

(.14737) (.0688) (.09811)

$$R^2 = .92$$

- (8) "Dietary Levels of Households in the Northeast, Spring, 1965", *Household Food Consumption Survey, 1965-66*, Table 18, p. 99, Report No. 7, Agricultural Research Service, United States Department of Agriculture.
- (9) The term "butter" as used in this paper means "total butter", except in this instance and in Table 1. "Total butter" consists of creamery butter, farm butter and whey butter. Creamery butter represents 97.5 per cent of the total butter consumed in Canada, and therefore, data on total butter and creamery butter can be considered comparable.

(10) "Full employment was assumed to exist in the private, non-farm sector when 96 per cent of the sector's labour force was being utilized or when the unemployment rate was 4 per cent", R. M. Will, studies of the Royal Commission on Taxation, No. 17, *Canadian Fiscal Policy 1945 to 1963*, Queen's Printer, Ottawa, December 1966.

(11) The expression "permanent data" is used here to describe the weighted data and means that these data are the result of structural factors alone.

(12) The explanatory model obtained was as follows:

$$q_b = 40.24 - .16386 p_b + .10825 p_m + .0183e - .01234y - .6184v \\ (.066782) \quad (.12294) \quad (.01306) \quad (.02159) \quad (.2501)$$

$$R^2 = .927$$

Where q_b = per capita consumption of butter

p_b = retail price of butter

p_m = retail price of margarine

e = per capita expenditure on food

y = per capita disposable income

v = weighted unemployment rate

(13) The other variables tested for this exercise were: per capita consumption of fats and oils as a whole; per capita medical expenditure; the Canadian population in the age group up to 14 years, as a percentage of total population; the Canadian population 40 years of age and over, as a percentage of total population; and the retail price ratio of butter to margarine. Per capita consumption of fats and oils was tested as a variable in order to show the opposite trend in consumption between butter and other commodities of the fats and oils group. Statistically and economically speaking, the results were meaningless. In an attempt to correlate the declining trend in butter consumption with the increasing concern about health and the fear of heart diseases in Canada, the variable "per capita medical expenditure" was tested. Although from a statistical point of view, the results were significant, it was felt that the use of this variable lacked economic justification. The two variables dealing with age groups were used in an attempt to explain the decline in butter consumption as a result of variations in the age structure of the population of Canada. The variable "percentage of population under 14 years of age" proved to be quite significant. It was inversely correlated with butter consumption which shows that butter has less appeal for the younger generation. The variable "percentage of population more than 40 years of age" did not prove to be significant. Both variables, however, were eliminated from the analysis for reasons of intercorrelation with other explanatory variables. The variable "ratio of the retail price of butter to the retail price of margarine" proved to be quite significant, but it was decided that if the prices of butter and margarine were treated as two separated variables, the explanatory capacity of the model would be increased.

(14) The annual rate of decline was obtained with the following formula:

$$\Delta = \left[\frac{Q_0}{Q_n} \right]^{\frac{1}{n}} - 1$$

Where Δ = annual rate of decline

n = number of observations

Q_0 = per capita consumption of butter at time 0 as computed from the trend line equation.

Q_n = per capita consumption of butter at time n as computed from the trend line equation.

The coefficient of variability was obtained with the following formula:

$$C.V. = \frac{\left[\frac{\sum(Y_i - \bar{Y})^2}{n - 1} \right]^{1/2}}{\bar{Y}}$$

Where n = number of observations

Y_i = per capita consumption of butter at time i as computed from the trend line equation.

\bar{Y} = average per capita consumption of butter at time i .

\bar{Y} = average per capita consumption of butter is during the period 1950 to 1969.

(15) The new parameters of the structural models described in footnote 7 are as follows:

MODEL I

Equation 1

$$\log q_b = 3.707 - .1889 \log p_b + .0347 \log p_m - .6827 \log y \\ (.2127) \quad (.0499) \quad (.1304)$$

$$R^2 = .965$$

Equation 2

$$\log q_m = .7358 + .1376 \log p_b - .1312 \log p_m + .5109 \log y \\ (.3405) \quad (.0799) \quad (.2088)$$

$$R^2 = .898$$

MODEL II

Equation 1

$$\log p_b = 3.3763 - .1247 \log p_b - .3214 \log q_m - .5033 \log y \\ (.1519) \quad (.1227) \quad (.1177)$$

$$R^2 = .975$$

Equation 2

$$\log q_m = 2.3043 - .842 \log q_b - .0986 \log p_m - .05166 \log y \\ (.3314) \quad (.0563) \quad (.1988)$$

$$R^2 = .927$$

Where q_b = per capita consumption of butter

q_m = per capita consumption of margarine

p_b = retail price of butter (1957 dollars)

p_m = retail price of margarine (1957 dollars)

y = per capita personal disposable income (1957 dollars)

(16) "The Population Projections for Canada 1969 to 1984", Analytical and Technical Memorandum No. 4, Census Division, Dominion Bureau of Statistics, Ottawa, April 1970.

(17) "How the \$1,500 Million Dairy Industry Aims to Boost Butter, Milk Products", *The Financial Post*, October 31, 1970, p. 6.

CHANGES IN THE MANUFACTURING MILK AND CREAM INDUSTRY UNDER THE CANADIAN DAIRY COMMISSION IN 1969-70

W. Y. Yang

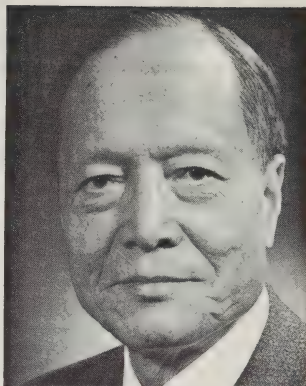
"...Eighty per cent of Canada's 115,829 dairy producers who shipped milk and cream under the CDC program in 1969-70 were quota holders..."

"...From 1968-69 to 1969-70 the total number of cream and milk producers was reduced by 11 per cent, but the average volume of milk and cream shipped per farm increased by 12 per cent..."

"In 1969-70, Quebec supplied half of all the butterfat while Ontario's share was 32 per cent..."

"Most manufacturing milk and cream farms are still too small to provide adequate farm income..."

"The accumulation of surplus dairy products in Canada implies that milk production must be controlled if market prices of dairy products are to be supported..."



Since the Canadian Dairy Commission (CDC) began its operations in 1966-67, many changes have occurred—changes in the number of producers participating in CDC's programs, in the amount of butterfat shipped by these producers, in the average size of shipment, and in the form in which butterfat was shipped (that is, as manufacturing milk or cream). Previous articles in this journal (1) have reviewed the variations in these factors during the period 1966-67 to 1968-69. This report points out the significant changes that occurred during the year from April 1, 1969 to March 31, 1970, (2).

Support Prices

The CDC's dairy policy during 1969-70 was, on the whole the same as in the previous year's, that is, the stabilization of the market prices of dairy products, and the regulations of quota entitlements for cream and manufacturing milk producers to support farm income levels and to promote efficient units of operation.

The support price for manufacturing milk for the period April 1, 1969 to March 31, 1970, was set at \$4.85 per hundredweight of milk testing 3.5 per cent butterfat, the same level of support as in the previous year. Since the federal government cannot fix prices for direct payments to be made to individual producers in the provinces, support price for milk is determined on the basis of the CDC's support prices of dairy products. During 1969-70, the support price on skim milk powder remained at 20 cents a pound, and on butter at 65 cents a pound, 2 cents higher than last year. To supplement the market value and

provide the \$4.85 support level, the CDC paid quota holders a direct subsidy of \$1.25 a hundredweight of manufacturing milk (testing 3.5 per cent butterfat), or the equivalent in cream.

However, the Commission held back part of the subsidy to help finance the disposal of surplus skim milk powder and butter. The "holdback" rate was 26 cents per hundredweight of manufacturing milk and one cent per pound of butterfat in cream.

Number of Shippers

During the first three years of the CDC's operations, the number of producers participating in CDC's programs decreased considerably, but the total supplies of manufacturing milk and cream increased slightly. Thus the CDC succeeded in reducing the number of producers, particularly the small producers; and in increasing the size of shipments, thereby increasing the income of the producers who remained in the industry.

The decreasing trend in the number of shippers of manufacturing milk and cream in Canada continued in 1969-70. From 1968-69 to 1969-70, the number of shippers of manufacturing milk decreased by more than eight per cent; the number of cream shippers, by more than 14 per cent; and the total number of cream and milk shippers, by more than 11 per cent (Table 1). Of the 115,829 dairy producers who shipped manufacturing milk and cream under the CDC's operational program in 1969-70, 55,429 were milk shippers, 62,461 were cream shippers, and 2,061 shipped both milk and cream. However, only about 93,000 (80 per cent) of these 115,829 shippers were

TABLE 1—NUMBER OF PRODUCERS SHIPPING MANUFACTURING MILK AND CREAM, CANADA, BY PROVINCE, 1969-70

	Number of Producers	Per- centage of Producers by Province	Change from 1968-69 to 1969-70	
			Number	Per cent
MANUFACTURING MILK				
Canada.....	55,429	100.0	— 5,185	— 8.6
P.E.I.....	697	1.3	— 121	—14.8
N.S.....	126	.2	— 25	—16.6
N.B.....	239	.4	— 86	—26.5
Que.....	35,185	63.5	— 2,975	— 7.8
Ont.....	16,772	30.3	— 1,685	— 9.1
Man.....	795	1.4	— 18	— 2.2
Sask.....	27	—	+ 5	+22.7
Alta.....	1,477	2.7	— 174	—10.5
B.C.....	111	.2	— 106	—48.8
CREAM				
Canada.....	62,461	100.0	—10,545	—14.4
P.E.I.....	2,038	3.3	— 287	—12.3
N.S.....	1,340	2.1	— 336	—20.1
N.B.....	1,799	2.9	— 275	—13.3
Que.....	7,735	12.4	— 1,481	—16.1
Ont.....	8,706	13.9	— 1,743	—16.7
Man.....	10,143	16.2	— 1,493	—12.8
Sask.....	15,214	24.4	— 2,118	—12.2
Alta.....	15,198	24.3	— 2,683	—15.0
B.C.....	288	.5	— 129	—30.9
TOTAL PRODUCERS*				
Canada.....	115,829	100.0	—14,635	—11.2
P.E.I.....	2,686	2.3	— 364	—11.9
N.S.....	1,444	1.3	— 335	—18.8
N.B.....	2,012	1.7	— 333	—14.2
Que.....	41,710	36.0	— 3,710	— 8.2
Ont.....	25,040	21.6	— 3,220	—11.4
Man.....	10,765	9.3	— 1,536	—12.5
Sask.....	15,231	13.2	— 2,120	—12.2
Alta.....	16,549	14.3	— 2,790	—14.4
B.C.....	392	.3	— 227	—36.7

— = less than 0.5 per cent.

* 2,061 of these producers shipped both manufacturing milk and cream.

CDC quota holders. The remaining 20 per cent of the shippers were registered producers who failed to qualify for quota entitlement, but continued to ship milk or cream in 1969-70.

Distribution of Shippers by Province

The proportion of shippers in each province in 1969-70 remained almost unchanged from 1968-69. Quebec and Ontario still accounted for more than 93 per cent of the manufacturing milk shippers in Canada, Quebec with 63.5 per cent and Ontario with 30.3 per cent. About 65 per cent of the cream shippers were in the three Prairie provinces. Saskatchewan and Alberta each had about 24 per cent and Manitoba, about 16 per cent.

In absolute terms, Quebec and Ontario experienced the largest decrease in the number of milk shippers in 1969-70, 2,975 and 1,685 shippers respectively. However, the rate of decrease in the number of milk shippers amounted to less than eight per cent in Quebec and about nine per cent in Ontario, compared with 49 per cent in British Columbia, 26 per cent in New Brunswick and 23 per cent in Saskatchewan. The three latter provinces produced relatively little manufacturing milk. In Alberta and Saskatchewan, the number of cream shippers decreased by 2,683 and 2,118 respectively.

Although these provinces had the largest absolute decreases in the number of cream shippers, the rate of decrease was only 15 per cent in Alberta and 12 per cent in Saskatchewan compared with 31 per cent in British Columbia and 20 per cent in Nova Scotia.

Of the total number of shippers of milk and cream, producers from Quebec and Ontario represented 36 and 22 per cent, and those from Alberta and Saskatchewan accounted for 14 and 13 per cent.

Quantity of Shipments

Because of quota limitations, total shipments of manufacturing milk and cream in Canada showed a slight decrease in 1969-70, less than one per cent (Table 2). Milk shipments increased by .8 per cent and cream shipments decreased by 4.6 per cent.

There was a large increase in milk shipments from Quebec (8.8 million pounds of butterfat) but decreases in some other provinces partially offset this gain, so that the net national increase in milk shipments was only two million pounds of butterfat. Prince Edward Island and Manitoba were the only other provinces that shipped more milk in 1969-70 than in 1968-69, but the increases, in terms of butterfat, were very small—5,000 pounds of butterfat for the former and 492,000 pounds of butterfat for the latter. In Ontario there was a decrease in manufacturing milk shipments amounting to 607 million pounds of butterfat, a reduction of about seven per cent from 1968-69. However, this decrease does not represent a net reduction in the total milk production in Ontario, as there were some 600 manufacturing milk producers who (under the Ontario Milk Marketing Board's Graduated Entry Program (3)) changed their quota status during the year and began to ship fluid milk instead of manufacturing milk.

Cream shipments decreased in 1969-70 in all provinces except Prince Edward Island and New Brunswick. For Canada, as a whole, the reduction in cream shipments was about five per cent from 1968-69, whereas in Prince Edward Island, shipments

TABLE 2—AMOUNT OF BUTTERFAT SHIPPED IN THE FORM OF MANUFACTURING MILK AND CREAM, CANADA, BY PROVINCE, 1969-70

	Amount of Butterfat Shipped	Percentage Shipped by Province	Percentage Change in Amount Shipped from 1968-69 to 1969-70
	thousand pounds		
MANUFACTURING MILK			
Canada.....	260,986	100.0	+ .8
P.E.I.....	1,998	.8	+ .2
N.S.....	344	.1	- 5.5
N.B.....	644	.2	-21.0
Que.....	153,715	58.9	+ 6.1
Ont.....	92,455	35.4	- 6.7
Man.....	3,542	1.4	-16.1
Sask.....	56	—	—
Alta.....	7,817	3.0	- .5
B.C.....	415	.2	-53.3
CREAM			
Canada.....	83,720	100.0	- 4.6
P.E.I.....	3,591	4.3	+ 1.7
N.S.....	1,162	1.4	- 7.3
N.B.....	2,838	3.4	+ 4.4
Que.....	13,755	16.4	- 2.3
Ont.....	16,742	20.0	- 9.1
Man.....	11,866	14.2	- 4.3
Sask.....	12,773	15.3	- 1.6
Alta.....	20,739	24.7	- 5.9
B.C.....	254	.3	-23.5
TOTAL BUTTERFAT			
Canada.....	344,706	100.0	- .6
P.E.I.....	5,589	1.6	+ 1.2
N.S.....	1,506	.4	- 6.9
N.B.....	3,482	1.0	- 1.4
Que.....	167,469	48.6	+ 5.4
Ont.....	109,197	31.7	- 7.1
Man.....	15,409	4.5	- .3
Sask.....	12,829	3.7	- 1.6
Alta.....	28,556	8.3	- 4.5
B.C.....	669	.2	-45.2

— = less than 0.5 per cent.

increased by 1.7 per cent and in New Brunswick, by 4.4 per cent.

As a result of these changes, the share of butterfat contributed by Quebec in 1969-70, in the form of both manufacturing milk and cream, increased to almost 50 per cent of the Canadian total, compared with 46 per cent in 1968-69. On the other hand, the share contributed by Ontario decreased to approximately 32 per cent, compared with 34 per cent in 1968-69. The share of butterfat contributed by each of the other provinces remained almost unchanged from the previous year.

Average Shipment Size

The average amount of butterfat shipped by cream producers increased from the previous year in Canada and in all provinces. The average amount

of butterfat shipped by manufacturing milk producers increased in Canada and in seven provinces, but decreased in Saskatchewan and British Columbia (Table 3). The average shipment of butterfat by producers of both manufacturing milk and cream increased by 12 per cent in Canada, by about 15 per cent in the three Atlantic provinces, Quebec and Manitoba; by 12 per cent in Saskatchewan and

TABLE 3—AMOUNT OF BUTTERFAT SHIPPED PER PRODUCER, IN THE FORM OF MANUFACTURING MILK AND CREAM, CANADA, BY PROVINCE, 1969-70

	Average Butterfat Shipment Per Producer	Percentage Change in Average Shipment from 1968-70	Average Shipment by Province as a Percentage of National Average
	pounds		
MANUFACTURING MILK			
Canada.....	4,708	+10.2	100.0
P.E.I.....	2,866	+17.7	60.9
N.S.....	2,730	+13.2	58.0
N.B.....	2,695	+ 7.5	57.0
Que.....	4,369	+15.1	92.8
Ont.....	5,512	+ 2.6	117.1
Man.....	4,456	+18.8	94.6
Sask.....	2,074	-18.3	44.2
Alta.....	5,292	+11.2	112.4
B.C.....	3,738	- 8.7	79.4
CREAM			
Canada.....	1,340	+11.5	100.0
P.E.I.....	1,762	+16.1	131.5
N.S.....	867	+15.9	64.7
N.B.....	1,578	+20.4	117.8
Que.....	1,778	+16.4	132.7
Ont.....	1,923	+ 9.1	143.5
Man.....	1,170	+ 9.8	87.3
Sask.....	840	+12.1	62.7
Alta.....	1,365	+10.8	101.9
B.C.....	883	+11.1	65.9
TOTAL BUTTERFAT			
Canada.....	2,976	+12.0	100.0
P.E.I.....	2,081	+15.0	69.9
N.S.....	1,043	+14.7	35.0
N.B.....	1,731	+14.9	58.2
Que.....	4,015	+14.7	134.9
Ont.....	4,361	+ 4.9	146.5
Man.....	1,431	+13.9	48.1
Sask.....	842	+12.1	28.3
Alta.....	1,726	+11.6	58.0
B.C.....	1,707	-13.4	57.4

Alberta; and by five per cent in Ontario. There was a 13 per cent decrease in average shipments per producer in British Columbia, where most of the manufacturing milk and cream was shipped by fluid milk producers.

The average amount of butterfat (from both manufacturing milk and cream) shipped by Ontario producers was 4,361 pounds in 1969-70, the largest

average shipment of all provinces and 147 per cent of the national average. The next largest average shipment came from Quebec, 4,015 pounds of butterfat or 135 per cent of the national average. The smallest average shipment came from producers in Saskatchewan and Nova Scotia—842 pounds (28 per cent of the national average) and 1,043 pounds (35 per cent of the national average) respectively.

Distribution of Producers and Deliveries by Size of Shipment

As noted previously, the number of producers who shipped manufacturing milk and cream in Canada decreased from 1968-69 to 1969-70. How-

TABLE 4—NUMBER OF PRODUCERS SHIPPING BUTTERFAT IN THE FORM OF MANUFACTURING MILK AND CREAM, ACCORDING TO ANNUAL SIZE OF SHIPMENT, CANADA, 1969-70

Shipment Class in Pounds of Butterfat	Number of Producers	Percentage Change in Number of Producers from 1968-69 to 1969-70	Percentage of Producers in each Shipment Class
MANUFACTURING MILK			
Less than 700 pounds	4,088	-16.5	7.4
700 to 1,399	4,116	-23.4	7.4
1,400 to 2,099	4,876	-23.5	8.8
2,100 to 2,799	5,479	-13.4	9.9
2,800 to 3,499	5,346	-17.2	9.6
3,500 to 4,199	5,081	- 9.7	9.2
4,200 to 4,899	4,569	- 3.4	8.2
4,900 to 5,599	3,923	- 3.1	7.1
5,600 to 6,299	3,395	- 3	6.1
6,300 to 10,499	10,906	+ 8.7	19.7
10,500 and more	3,650	+22.9	6.6
Sub-total	55,429	- 8.6	100.0
CREAM			
Less than 700 pounds	24,735	-23.1	39.6
700 to 1,399	15,854	-13.7	25.4
1,400 to 2,099	9,062	- 8.7	14.5
2,100 to 2,799	5,209	- 4.5	8.3
2,800 to 3,499	3,095	+ 2.0	4.9
3,500 to 4,199	1,820	+ 3.5	2.9
4,200 to 4,899	1,082	+12.1	1.7
4,900 to 5,599	662	+14.5	1.1
5,600 to 6,299	351	+13.6	.6
6,300 to 10,499	545	+29.5	.9
10,500 and more	46	+48.4	.1
Sub-Total	62,461	-14.5	100.0
MANUFACTURING MILK AND CREAM*			
Less than 700 pounds	27,239	-21.2	23.5
700 to 1,399	19,524	-15.3	16.8
1,400 to 2,099	13,771	-14.3	11.9
2,100 to 2,799	10,638	-12.5	9.2
2,800 to 3,499	8,451	-11.1	7.3
3,500 to 4,199	6,919	- 6.9	6.0
4,200 to 4,899	5,681	- 1.1	4.9
4,900 to 5,599	4,610	- 1.5	4.0
5,600 to 6,299	3,767	+ 7	3.3
6,300 to 10,499	11,518	+ 9.5	9.9
10,500 and more	3,711	+23.0	3.2
Total	115,829	-11.2	100.0

* 2,061 of these producers shipped both manufacturing milk and cream.

ever, the number of manufacturing milk producers who had an average shipment of *more than 6,300 pounds of butterfat* (or 180,000 pounds of milk) increased; the number of cream producers who shipped more than 2,800 pounds of butterfat (or 80,000 pounds of milk) also increased (Table 4). It was the number of shippers in the smaller shipment size classes of both manufacturing milk and cream that decreased. The larger the amount of butterfat shipped, the higher was the percentage increase in the number of shippers in the class. This was also true in the other years (1967-68 and 1968-69) of operation of the Canadian Dairy Commission.

TABLE 5—AMOUNT OF BUTTERFAT SHIPPED IN THE FORM OF MANUFACTURING MILK AND CREAM, ACCORDING TO ANNUAL SIZE OF SHIPMENT, CANADA, 1969-70

Shipment Class in Pounds of Butterfat	Amount of Butterfat Shipped	Percentage Change in Amount Shipped from 1968-69 to 1969-70	Percentage of Total Amount Shipped
thousand pounds			
MANUFACTURING MILK			
Less than 700 pounds	1,267	-18.5	.5
700 to 1,399	4,373	-23.4	1.7
1,400 to 2,099	8,581	-23.4	3.3
2,100 to 2,799	13,431	-18.2	5.1
2,800 to 3,499	16,836	-16.9	6.5
3,500 to 4,199	19,533	- 9.7	7.5
4,200 to 4,899	20,752	- 3.8	8.0
4,900 to 5,599	20,552	- 2.6	7.9
5,600 to 6,299	20,155	- 3	7.7
6,300 to 10,499	87,237	+ 9.3	33.4
10,500 and more	48,269	+22.2	18.5
Sub-total	260,986	+ 6.2	100.0
CREAM			
Less than 700 pounds	7,755	-23.1	9.3
700 to 1,399	16,146	-13.1	19.2
1,400 to 2,099	15,578	- 8.6	18.6
2,100 to 2,799	12,585	- 4.2	15.0
2,800 to 3,499	9,640	+ 2.0	11.5
3,500 to 4,199	6,946	+ 3.6	8.4
4,200 to 4,899	4,899	+12.0	5.9
4,900 to 5,599	3,451	+15.8	4.1
5,600 to 6,299	2,081	+13.5	2.5
6,300 to 10,499	4,056	+29.0	4.8
10,500 and more	583	+40.1	.7
Sub-total	83,720	- 4.6	100.0
MANUFACTURING MILK AND CREAM			
Less than 700 pounds	8,641	-21.8	2.5
700 to 1,399	20,077	-15.0	5.8
1,400 to 2,099	23,883	-14.3	6.9
2,100 to 2,799	25,897	-12.3	7.5
2,800 to 3,499	26,503	-11.0	7.7
3,500 to 4,199	26,552	- 6.9	7.7
4,200 to 4,899	25,793	- 1.5	7.5
4,900 to 5,599	24,135	- 9	7.0
5,600 to 6,299	22,364	+ 6	6.5
6,300 to 10,499	91,819	+ 9.9	26.7
10,500 and more	49,036	+22.3	14.2
Total	344,706	+ 6	100.0

Compared with previous years, the percentages of producers in the larger shipment size classes (more than 6,300 pounds of butterfat) increased noticeably, particularly for the manufacturing milk shippers. Nevertheless, the concentration of cream producers in the smaller shipment classes is still very significant.

About 52 per cent of the manufacturing milk shipped in Canada in 1969-70 was delivered by the 14,500 "large" producers (those with shipments of more than 6,300 pounds of butterfat). These large producers represented only 26 per cent of all milk producers (Table 5). Taking into consideration both milk and cream shippers, 62 per cent of total butterfat deliveries in Canada came from about 29,000 large producers, about 25 per cent of all shippers.

SUMMARY

The decreasing trend in the number of shippers of manufacturing milk and cream in Canada, which occurred from 1966-67 to 1968-69, continued in 1969-70. The rate of decrease was about 11 per cent from 1968-69 to 1969-70. However, the number of manufacturing milk producers who shipped more than 6,300 pounds of butterfat and the number of cream producers who shipped more than 2,800 pounds of butterfat increased.

Total shipments of butterfat, both as manufacturing milk and as cream, declined slightly (by about .6 per cent) in Canada in 1969-70, but the shipments of manufacturing milk increased by .8 per cent, mainly as a result of increased shipments from Quebec. The share of butterfat contributed by Quebec increased to almost 50 per cent of all butterfat shipped in Canada in 1969-70, compared with 46 per cent in the previous year.

The average amount of butterfat shipped by both manufacturing milk and cream producers in Canada increased by 12 per cent from 1968-69 to 1969-70. This shows a trend toward rationalization of dairy enterprises in Canada.

Since the inception of the Canadian Dairy Commission, significant changes have taken place in the

structure of the dairy industry in Canada. The number of manufacturing milk producers who shipped more than 5,600 pounds of butterfat represented only 17 per cent of all producers in 1966-67 but increased to 32 per cent in 1969-70. The quantity of milk contributed by these large producers amounted to 42 per cent in 1966-67 and increased to almost 70 per cent in 1969-70.

Cream production is in most cases, a part-time farm enterprise and the units of operation are small. However, there were more cream producers than manufacturing milk producers in all four years of the CDC's operation. During the time, changes in the structure of cream enterprises, although following the same general patterns as those of the milk industry, have been relatively slow.

Most manufacturing milk and cream enterprises in Canada are still too small to achieve an efficient level of operation and a higher income, and annual output per farm must increase for individuals to reach these goals. However, the accumulation of surpluses in dairy products (especially skim milk powder) implies that total milk production in Canada must be controlled if market prices of dairy products are to be continuously supported. One solution to this problem would be for even more dairy producers to give up dairying. This would mean alternative employment opportunities, either on or off the farm, would have to be available.

NOTES AND REFERENCES

- (1) Yang, W. Y., "Changes in Producers' Shipments of Manufacturing Milk and Cream under the Operation of the Canadian Dairy Commission", *Canadian Farm Economics*, Vol. 5, No. 1, April 1970, pp. 25 to 32.
- (2) Acknowledgement is made of the statistical data and background information made available by Dr. H. J. Mestern, Economic Advisor of the Canadian Dairy Commission.
- (3) The Graduated Entry Program of the Ontario Milk Marketing Board provides for the allocation of fluid milk quotas, over a period of five years, to producers of manufacturing milk (Ontario Group 1 Pool Shippers) who meet the Grade A standards in farm facilities and milk quantity.

POLICY AND PROGRAM DEVELOPMENTS

Agricultural Products Co-operative Marketing Act Agreement (Apples for Processing)—The Co-operative Monteregienne of Quebec has entered into an agreement with the federal government, under the Agricultural Products Co-operative Marketing Act, for the marketing of apples produced in 1970 to be processed and sold in the form of apple juice, apple sauce, apple pulp and jelly.

The agreement specifies the grades of apples that may be used in the manufacture of each product and sets minimum quality standards for the final products.

The initial price to be paid for apples for processing is 40 cents a bushel. If the average wholesale price obtained by the processor from the sale of these apples (in processed form) is less than the initial price plus the processing, carrying and selling costs, the federal government will make up the difference. The agreement came into force August 15, 1970 and will continue to December 31, 1971. (September 9, 1970)

Ontario Crop Insurance Amendment—Apples, peas, sweet corn for processing and corn grown for silage have been added to the list of crops eligible for crop insurance in Ontario. Other crops for which crop insurance plans are available include winter wheat, spring grain, forage, corn, soybeans, white beans, tomatoes and potatoes. (September 29, 1970)

Manitoba Crop Insurance Amendments—The list of crops eligible for crop insurance in Manitoba has been amended to include buckwheat and grain corn. Other amendments to the crop insurance agreement have changed the premium rates for the insurance of wheat, oats, barley, flax, fall rye, rapeseed, tame yellow mustard, field peas and sunflowers. (September 23, 1970)

Ontario Apple Marketing Order—The Ontario Apple Marketing Commission has been given the authority to regulate interprovincial and export trade of Ontario apples, under the provisions of the Agricultural Products Marketing Act. (October 6, 1970)

Wheat Inventory Reduction Regulations—These regulations have been amended thereby setting a limit of \$6,000 on the total amount of wheat inventory reduction payments that may be made to any applicant. The conditions under which a late application for payment will be accepted were also added to the regulations. (October 6, 1970)

Prince Edward Island Potato Marketing Order—By an amendment to this order, the Prince Edward Island Potato Marketing Board may collect levies on potatoes marketed during the period up to December 31, 1971. The levies are the same as in the previous year; that is, .75 cents a hundredweight on sales of potatoes to processors and 1.5 cents a hundredweight on other potato sales. (October 21, 1970)

Egg Support Program—The average producer price of Grade A Large eggs was 39.83 cents a dozen in the support year ended September 30, 1970. This price is greater than the floor price set by the Agricultural Stabilization Board; therefore, no deficiency payment will be made under the ASB's egg support program this year. (November 6, 1970)

Economics Branch Appointment—The Honorable H. A. Olson, Minister of Agriculture, announced the appointment of Dr. G. A. Hiscocks to the position of Director of the Economic Policy and Planning Secretariat at the Economics Branch, Canada Department of Agriculture. Dr. Hiscocks was formerly the Director of the Marketing and Trade Division of the Economics Branch. (November 13, 1970)

PUBLICATIONS

ECONOMIC BRANCH PUBLICATIONS

Trade in Agricultural Products, 1968 and 1969, D. L. Bolton, Economics Branch, Canada Department of Agriculture, Ottawa, August 1970, Pub. No. 70/12, pp. 11+38.

This bulletin, the fifteenth in a series, presents Canadian agricultural trade data, classified by commodity grouping and by country of origin or destination. Although the emphasis is on current statistics, historical summaries are also included.

An Economic Analysis of Beef Cattle-Grain Operations in West Central Manitoba, L. M. Johnson and W. J. Craddock, Economics Branch, Canada Department of Agriculture, Regina and Department of Agricultural Economics and Farm Management, University of Manitoba, Winnipeg, June 1970, Pub. No. 70/9, pp. iv+39.

This bulletin contains the results of a study which examined the economic feasibility of beef cattle production in West Central Manitoba. Linear programming models were used to depict resource availabilities and production alternatives typical of farms in the study area, taking into account the competitive and complementary relationships between livestock and crop production.

Situation '70 and Outlook '71, Market Outlook Section, Marketing and Trade Division, Economics Branch, Canada Department of Agriculture, Ottawa, 1970.

These two publications contain the background material for the 31st Canadian Agricultural Outlook Conference held on November 23 and 24, 1970. The Situation bulletin describes the recent trends in the production and marketing of agricultural commodities and the Outlook report gives the expected future trends for the same commodities.

A third bulletin, **Proceedings of the 1970 Outlook Conference**, contains the speeches presented at the Conference, a report on the implications of the outlook statement and a summary of the Conference discussions. This bulletin is also available from the Economics Branch.

UNITED NATIONS PUBLICATIONS

Available in Canada from
Information Canada, 171 Slater St., Ottawa

Processed Fruits and Vegetables, Trends in World Production and Trade of Citrus Products, Canned Peaches and Apricots, and Tomato Products, Commodity Bulletin 47, Food and Agriculture Organization of the United Nations, Rome, 1970, pp. vi+76.

This report contains three studies which give: 1) brief accounts of the characteristics of the products considered and their markets; and 2) review the recent trends in output, consumption and prices. Conditions of market access and trade policies related to these commodities are also reviewed.

Production and Economic Planning Development Centre, Organization for Economic Co-operation and Development, Paris, 1970, pp. iii+323. Price \$5.50.

The purpose of this book is to review studies of the relationship between productivity and economic planning. The main topics considered are: 1) the role of productivity in economic growth; 2) the present position of productivity organizations in national economic structures and the contributions made by these organizations; and 3) productivity and regional economic integration.

Most of the material in this publication was presented at a June 1968 Symposium in Paris, on Productivity and Economic Planning, sponsored by the OECD Development Centre.

OECD Schemes for the Varietal Certification of Herbage, Seed, of Sugar Beet and Fodder Beet Seed, and of Cereal Seed, moving in International Trade, Organization for Economic Co-operation and Development, Paris, 1970. Price \$1.50.

These three booklets describe the OECD certification program and explain the standards that seeds must meet in order to bear OECD labels.

OTHER PUBLICATIONS

Not Available from the Economics Branch

Agricultural Statistics, 1970, Prince Edward Island Department of Agriculture and Forestry, Charlottetown, 1970, pp. 60

This handbook serves as a ready reference about the agricultural situation in Prince Edward Island in 1970.

Canadian Beef Industry, Proceedings of the 1970 Canadian Agricultural Economics Society Workshop. Single copies at \$3.50 are available from the society at Suite 907, 151 Slater Street, Ottawa 4, Ontario.

The proceedings contain the following articles:

- The U.S. Livestock-Beef Structure and Outlook
- Canada's Meat Packing Industry
- The Preparation of Outlook Material
- Meat Retailing
- The Canadian Retail Food Situation
- Canfax
- Dairy-Beef
- Forage Requirements and Range Management

Management and Environmental Factors Influencing the Efficiency of Beef Production
A New Grading System for Beef
International Trade in Beef
World Potential for Canadian Beef
Implications of Development Marketing Practices and Structure to the Canadian Beef Industry
Comment: Implications of Development Marketing Practices, etc.
Beef Cattle Marketing Problems in Alberta

Federal Farm Credit and Related Statistics, 1970, Farm Credit Corporation, Ottawa. pp.64.

Statistics on the operations of the Farm Credit Corporation and related data from other sources are brought together in this publication to provide a comprehensive compilation of information pertinent to farm finance. Significant changes in the statistics and explanations of terms used are also included in this publication. The Farm Credit Corporation intend to issue this type of report annually.

Manitoba Agriculture, Phyllis Thomson, Manitoba Department of Agriculture, Winnipeg, 1970. pp. 28.

Published for Manitoba's centennial year, this publication traces Manitoba's agricultural industry from 1870 to the present and outlines the services provided by the Manitoba Department of Agriculture.

Marketing of Ontario's Greenhouse Vegetable Products in Competition With Imports from Mexico, H. Blum, Farm Economics, Co-operatives and Statistics Branch, Ontario Department of Agriculture and Food, Toronto, 1969. pp. vii + 90.

This study presents information on the background, development, economic structure and distribution procedures of the greenhouse industry of Ontario and the fresh vegetable export industry of West Mexico.

Rural Canada 1970: Prospects and Problems, Third Report and Review, Canadian Council on Rural Development, Ottawa, 1969. pp. xv + 85.

The report covers a survey of relevant parameters of rural and urban Canada, examines the role of government in rural development, outlines guidelines for future progress and some possible hazards, and gives recommendations for action.

Structural Unemployment: Theory and Measurement, G. P. Penz, Program Development Service, Department of Manpower and Immigration, Ottawa 1969. pp. ix + 91.

This publication presents a theoretical framework which could be used to measure structural unem-

ployment; it will be useful to those now charting decisions that affect the use and productivity of Canadian manpower.

Learning for Individual and Social Development, D. M. Connor, S. H. Searle and K. T. Bradley, Research Report RE-5, Social and Human Analysis Branch, Planning Division, Department of Regional Economic Expansion, Ottawa, 1970. pp. 82.

This report was designed primarily as an aid to developing staff training for field personnel concerned with economic and social development; it is a descriptive report as well as a type of workbook of guidelines for those involved in field staff training.

The Growth of Manpower in Canada, F. T. Denton, Labour Force Studies Series in the 1961 Census Monograph Program, Dominion Bureau of Statistics, Ottawa, 1970. pp. xi + 85.

This study is one of a series dealing with selected aspects of the labor force in Canada as revealed in the 1961 and earlier censuses. The study is concerned with the growth and changes in Canadian manpower.

Markets Bulletin, British Columbia Department of Agriculture, Victoria, Vol 1, No. 18, October 28, 1970.

This issue contains reports titled:

World Grain Production Down, Stocks Still Up
New Variety of Rapeseed Coming Up
Depressed Outlook for Ranch Fur
Interest Growing in "Agrifoam"
Canadians "Nutritionally Illiterate"?

Performance and Potential, Mid-1950's to Mid-1970's, Economic Council of Canada, October, 1970. pp. 85. Single copies \$1.50. Available from Information Canada, Ottawa.

This publication outlines the major features of performance in the economy and includes chapters on the lessons to be learned from the 1960's and the challenges of the 1970's. There is also a section on the implications for policy.

Publications of the Royal Commission on Farm Machinery, Information Canada, Ottawa. The following is a list of the reports and studies of the Royal Commission on Farm Machinery.

Special Report on Prices of Tractors and Combines, in Canada and other Countries, Cat. No. Z1-1966/4-1-1, Price: \$2.50. (also available in French)

Farm Machinery Safety: Physical Welfare Effects of the Man-Machine Interaction on Farms, G. F. Donaldson, Cat. No. Z1-1966/4F, Price: \$1. (also available in French)

Farm Tractor Production Costs: A Study in Economies of Scale, N. B. MacDonald, W. F. Barnicke, F. W. Judge, K. E. Hansen, Cat. No. Z1-1966/4-2, Price: \$3.00.

Productivity in the Farm Machinery Industry: A Comparative Analysis between Canada and the United States, Christopher J. Maule, Cat. No. Z1-1966/4-3, Price: \$1.

Farmers' Attitudes to Farm Machinery Purchases: A Survey Conducted in the Prairies Provinces, in Mid-1967, Alexander Segall, Cat. No. Z1-1966/4-4, Price: \$1.25.

The Prairie Farm Machinery Co-operative: "The Canadian Co-operative Implements Limited", Rubin Simkin, Cat. No. Z1-1966/4-5, Price: \$1.50.

Locational Advantages in the Farm Machinery Industry, Neil B. MacDonald, Cat. No. Z1-1966/4-6, Price: \$2.25.

Research and Development in the Farm Machinery Industry, Alex G. Vicas, Cat. No. Z1-1966/4-7, \$1.50. (also available in French)

Farm Machinery Testing, G. F. Donaldson, Cat. No. Z1-1966/4-8, Price \$1.25.

CORRECTIONS

Volume 5, Number 3, August 1970

Page 24, right column—Uses of Mustard Seed—The third sentence should read "Yellow mustard seed is normally used to produce the milder mustard preparations while the hotter, more pungent preparations are obtained from the brown and oriental varieties".

Page 25, Table 6—the units should be "thousand long tons".

Demand for Farm Machinery—Western Europe, Henry G. Scott and David J. Smyth, Cat. No. Z1-1966/4-9, Price: \$2.

Farm Machinery Capacity: An Economic Assessment of Farm Machinery Capacities in Field Operation, G. F. Donaldson, Cat. No. Z1-1966/4-10, Price: \$2.

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Canadian Farm Economics is published bi-monthly by the Economics Branch, Canada Department of Agriculture, Sir John Carling Building, Ottawa, and is based on material prepared by economists of the Economics Branch.

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CANADIAN FARM ECONOMICS

TRENDS IN FEED GRAIN PRODUCTION AND UTILIZATION AND THE FEED FREIGHT ASSISTANCE POLICY



S. W. Garland*

BACKGROUND

Under the authority of the Feed Grain Assistance Regulations of the Appropriations Act, the federal government, in 1941, instituted a policy to assist farmers develop their livestock enterprises in Eastern Canada and British Columbia. The program consisted of subsidizing the transportation costs of feed grains from the Prairie Provinces to the eastern provinces and British Columbia. During the war years and during the period 1963-66, storage costs were also subsidized.

The Livestock Feed Assistance Act, 1966, established the Canadian Livestock Feed Board. In April 1967, this Board took over the administration of all matters pertaining to freight and storage assistance on

This policy has helped move 68 million tons of feed out of the Prairies at a cost of \$475 million dollars since 1941. (\$17 million per year).

Prairie livestock farmers and eastern grain growers claim that they are disadvantaged by the policy.

Prairie grain growers and eastern feeders claim they need the program.

Here is a presentation of the statistics!

feed grains, and was authorized to make payments related to the cost of storage and transportation of feed grains.

The objectives of the Board are to ensure:

- (1) the availability of feed grain to meet the needs of livestock feeders;
- (2) the availability of adequate storage space in Eastern Canada for feed grain to meet the needs of livestock feeders;
- (3) reasonable stability in the price of feed grain in Eastern Canada and in British Columbia;
- (4) fair equalization of feed grain prices in Eastern Canada and in British Columbia.

Under the Regulations of the Livestock Feed Assistance Act, the Canadian Livestock Feed Board may pay transportation assistance according to a prescribed schedule on:

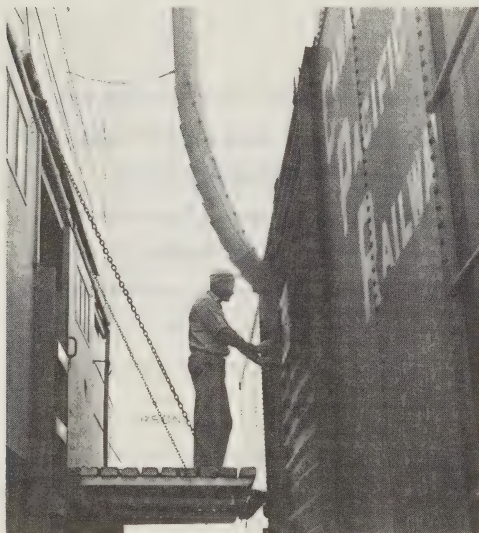
- (1) wheat, oats, barley and rye grown in Western Canada and shipped to a destination in Eastern Canada;

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- (2) No. 1 Feed Screenings and Sample Feed Grain produced in Western Canada and shipped to a destination in Eastern Canada;
- (3) wheat bran, wheat shorts and wheat middlings produced in Western Canada and shipped to a destination in Eastern Canada or produced in Eastern Canada from wheat grown in Western Canada;
- (4) wheat, oats, barley, rye and grain corn grown in the Prairie Region and shipped to a destination in British Columbia;
- (5) No. 1 Feed Screenings and Sample Feed Grain produced in the Prairie Region and shipped to a destination in British Columbia;
- (6) wheat bran, wheat shorts and wheat middlings produced in the Prairie Region and shipped to

General Observations

The federal government program to provide freight assistance to move feed grains from the Prairie Provinces to British Columbia and Eastern Canada has been a controversial issue between agricultural producers in these regions. Farmers in the Prairie Provinces claim that they are disadvantaged in livestock production when the grains they grow are shipped at subsidized rates for livestock feed in other regions. The farmers in these other regions claim that they are disadvantaged unless they can obtain the feed grains at prices equivalent to those prevalent in the Prairie Provinces. It is argued too, that the shipment in of these prairie grains hinders expansion of the grain-growing industry in Eastern Canada.



a destination in British Columbia or produced in British Columbia from wheat grown in the Prairie Region;

- (7) wheat grown in Ontario and shipped to a destination in Eastern Canada other than a destination in Ontario;
- (8) grain corn grown in Ontario and shipped to a destination in Eastern Canada other than a destination in Ontario or Quebec.

The Board may also pay assistance in respect of storage expenses on wheat, oats and barley grown in Western Canada and stored in Eastern Canada (except at Thunder Bay) where grain is initially stored in a vessel approved by the Board as a place of storage necessary to supplement licensed elevator storage.

The program undoubtedly encourages some increase in the market for prairie feed grains in Eastern Canada and British Columbia. The extent of this increase is difficult to determine because some of this grain would be used in these provinces even if there was no freight assistance. Any increase in the market for prairie-grown feed grains does help prairie farmers by providing a market for a crop other than wheat. The program does, however, remove some of the competitive advantage of the livestock producer in Western Canada because it makes feed grains available to livestock producers in the other regions at lowered freight costs. The acreages seeded to grains in many areas of Eastern Canada were declining for many years before the feed freight assistance program was instituted. It is doubtful that the program hinders a change in this direction.

Cost of the Program

From the institution of the program in 1941 to the end of the 1968-69 crop year, more than \$475 million had been paid to subsidize the shipment of feed grains to Eastern Canada and British Columbia (1). The provincial distribution of the expenditure was as follows: Quebec, 42.6 per cent; Ontario, 27.6 per cent; British Columbia, 10.3 per cent; Nova Scotia, 9.3 per cent; New Brunswick, 6.1 per cent; Prince Edward Island, 2.2 per cent; and Newfoundland, 1.9 per cent (2).

Destination of Grain Shipped

The more than 68.5 million tons of feed shipped under the feed freight assistance program to the end of 1968-69 were distributed by province as follows:

Province	Per Cent
Quebec	41.1
Ontario	38.4
British Columbia	9.2
Nova Scotia	5.5
New Brunswick	3.9
Prince Edward Island	1.3
Newfoundland	.6

Type of Grain Shipped

By type of feed, the shipments were:

Feed	Per Cent
Barley	26.4
Oats	26.4
Millfeeds	22.9
Wheat	20.5

Screenings	3.2
Rye	.3
Corn	.3

Quantity of Grain Shipped

The quantity of feed shipped each year fluctuated between 1.9 million tons and 3.0 million tons during the past 20 years (3). When based on five-year averages, the quantity didn't change appreciably:

1949-50 to 1953-54 = 2.3 million tons,
1954-55 to 1958-59 = 2.5 million tons,
1959-60 to 1963-64 = 2.3 million tons,
1964-65 to 1968-69 = 2.4 million tons.

Analysis of Trends

The following is an analysis of trends in the shipment of feeds under the freight assistance program during the past two decades. More specifically, the trends examined are: the quantity of each kind of feed shipped, the proportions of prairie grain production shipped under the program and the production and use of feed grains in Eastern Canada and British Columbia.

In 1969-70, three million tons of grain were shipped under the feed freight assistance program. Shipments from the Prairie Provinces to Eastern Canada and British Columbia were 674,481 tons more than in 1968-69. Almost all of the increase was in the form of barley and wheat. The lower grain prices caused by the unusually large stocks of grain in the Prairie Provinces contributed to the increase. It cannot be considered a significant part of any trend.

TABLE 1—BARLEY: PRODUCTION IN THE PRAIRIE PROVINCES, PRODUCERS' MARKETINGS AND FREIGHT-ASSISTED SHIPMENTS, 1949-50 TO 1968-69

Period	Production	Producers'	Marketings	Freight-Assisted Shipments		
		Quantity	Proportion of Production	Quantity	Proportion of Production	Proportion of Marketings
	thousands of bushels		per cent	thousands of bushels	per cent	per cent
1949-50 to 1953-54.....	206,400	106,702	51.7	20,205	9.8	18.9
1954-55 to 1958-59.....	222,600	117,479	52.8	25,913	11.6	22.0
1959-60 to 1963-64.....	174,600	83,048	47.6	29,233	16.7	35.2
1964-65.....	157,000	74,979	47.8	29,240	18.6	39.0
1965-66.....	202,000	93,886	46.5	29,328	14.5	31.2
1966-67.....	283,000	112,740	39.8	35,936	12.7	31.9
1967-68.....	230,000	87,305	38.0	36,277	15.8	41.6
1968-69.....	301,000	81,766	27.2	36,694	12.2	44.9
1964-65 to 1968-69.....	234,600	90,135	38.4	33,495	14.3	37.2
1969-70.....	355,000			48,043	13.5	

Sources: (1) *Annual Report of the Canadian Wheat Board*.

(2) *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-033, Dominion Bureau of Statistics.

(3) *Handbook of Agricultural Statistics*, Field Crops, Cat. No. 21-501, Dominion Bureau of Statistics.

(4) *Annual Report of the Canadian Livestock Feed Board*.

Barley

The quantity of barley shipped annually under the feed freight assistance program increased from an average of 20.2 million bushels during 1949-50 to 1953-54 to 33.5 million bushels during 1964-65 to 1968-69 (Table 1).

Freight-assisted shipments of feed barley averaged 14.3 per cent of the barley produced in the Prairie Provinces during the 1964-65 to 1968-69 period. The proportion was smaller than during the previous five-year period but the average production in the 1964-65 to 1968-69 period was 60 million bushels larger.

Barley marketings in the Prairie Provinces were about 26 million bushels a year less during the past decade than during the previous one. The decrease in producer marketings was due to a decline in barley exports. As a proportion of production, producer marketings declined from more than half to less than 40 per cent. In 1968-69, marketings were only 27 per cent of production. Freight-assisted shipments of barley have become an increasingly large proportion of marketings. During the 1950's, shipments under freight assistance averaged about 20 per cent of marketings, during 1959-60 to 1963-64, the proportion increased to 35.2 per cent; and during 1964-65 to 1968-69, increased to 37.2 per cent.

TABLE 2—OATS: PRODUCTION IN THE PRAIRIE PROVINCES, PRODUCERS' MARKETINGS AND FREIGHT-ASSISTED SHIPMENTS, 1949-50 TO 1968-69

Period	Production	Producers'	Marketings	Freight-Assisted Shipments		
		Quantity	Proportion of Production	Quantity	Proportion of Production	Proportion of Marketings
	thousands of bushels		per cent	thousands of bushels	per cent	per cent
1949-50 to 1953-54.....	281,420	105,372	37.4	43,695	15.5	41.5
1954-55 to 1958-59.....	237,200	61,731	26.0	40,955	17.3	66.3
1959-60 to 1963-64.....	238,000	45,772	19.2	30,291	12.7	66.2
1964-65.....	206,000	41,002	19.9	33,772	16.4	82.4
1965-66.....	272,000	51,715	19.0	36,852	13.5	71.2
1966-67.....	258,000	38,427	14.9	39,892	15.5	103.8
1967-68.....	195,000	30,818	15.8	35,399	18.2	114.9
1968-69.....	249,000	41,574	16.7	26,605	10.7	64.0
1964-65 to 1968-69.....	236,000	40,707	17.2	34,504	14.6	84.8
1969-70.....	278,000			28,788	10.4	

Sources: (1) *Annual Report of the Canadian Wheat Board*.

(2) *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

(3) *Handbook of Agricultural Statistics*, Field Crops, Cat. No. 21-501, Dominion Bureau of Statistics.

(4) *Annual Report of the Canadian Livestock Feed Board*.

TABLE 3—WHEAT: PRODUCTION IN THE PRAIRIE PROVINCES, PRODUCERS' MARKETINGS AND FREIGHT-ASSISTED SHIPMENTS, 1949-50 TO 1968-69

Period	Production	Producers'	Marketings	Freight-Assisted Shipments		
		Quantity	Proportion of Production	Quantity	Proportion of Production	Proportion of Marketings
	thousands of bushels		per cent	thousands of bushels	per cent	per cent
1949-50 to 1953-54.....	518,400	415,146	80.1	13,885	2.7	3.3
1954-55 to 1958-59.....	419,200	356,225	85.0	19,511	4.7	5.5
1959-60 to 1963-64.....	487,400	424,597	87.1	15,419	3.2	3.6
1964-65.....	578,000	524,515	90.7	12,819	2.2	2.4
1965-66.....	632,000	569,363	90.1	17,235	2.7	3.0
1966-67.....	807,000	632,362	78.4	16,939	2.1	2.7
1967-68.....	574,000	456,015	79.4	11,509	2.0	2.5
1968-69.....	629,000	423,161	67.3	11,363	1.8	2.7
1964-65 to 1968-69.....	644,000	521,083	80.9	13,973	2.2	2.7
1969-70.....	665,000			26,035	3.9	

Sources: (1) *Annual Report of the Canadian Wheat Board*.

(2) *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.

(3) *Handbook of Agricultural Statistics*, Field Crops, Cat. No. 21-501, Dominion Bureau of Statistics.

(4) *Annual Report of the Canadian Livestock Feed Board*.

Oats

The quantity of oats shipped annually under the feed freight assistance program increased from 30.3 million bushels during 1959-60 to 1963-64 to 34.5 million bushels during 1964-65 to 1968-69 (Table 2). However, in 1968-69, the quantity shipped was only 26.6 million bushels. During the 1950's, more than 40 million bushels of oats were shipped annually under the program.

Freight-assisted shipments of oats averaged 14.6 per cent of production during the period 1964-65 to 1968-69, up from 12.7 per cent during the previous five years but down from the more than 17 per cent during the late 1950's.

Prairie marketings of oats have been declining. Marketings during 1964-65 to 1968-69 averaged 40.7 million bushels compared with 105.4 million bushels during 1949-50 to 1953-54. The quantity shipped under freight assistance has been increasing as a proportion of marketings, from 41.5 per cent in the early fifties to 84.8 per cent during the late sixties.

Wheat

The quantity of wheat shipped under the feed freight assistance program averaged 14 million bushels a

year from 1964-65 to 1968-69, about the same quantity as was shipped annually during the early fifties but somewhat less than during the intervening decade (Table 3). As a proportion of production or of marketing, freight-assisted shipments of wheat are not large, about 2.2 per cent of production and 2.7 per cent of marketings during 1964-65 to 1968-69. These proportions are somewhat smaller than during previous periods. Shipments increased substantially in 1969-70 because of the unusually large stocks and the lower prices. More than 26 million bushels were shipped.

Rye

The quantity of rye shipped under the feed freight assistance program averaged 775,000 bushels a year from 1964-65 to 1968-69, a substantial increase from the average of 47,000 bushels during the previous five-year period (Table 4). Shipments were 1.2 million bushels in 1967-68 but declined to 674,000 bushels in 1968-69 and to 81,000 bushels in 1969-70. As a proportion of production and of marketings, shipments increased substantially during 1964-65 to 1968-69. During this period, shipments averaged 6.0 per cent of production compared with about one per cent in earlier periods, and 9.4 per cent of marketings compared with about one per cent in earlier periods.

TABLE 4—RYE: PRODUCTION IN THE PRAIRIE PROVINCES, PRODUCERS' MARKETINGS AND FREIGHT-ASSISTED SHIPMENTS, 1949-50 TO 1968-69

Period	Production	Producers'	Marketings	Freight-Assisted Shipments		
		Quantity	Proportion of Production	Quantity	Proportion of Production	Proportion of Marketings
	thousands of bushels		per cent	thousands of bushels	per cent	per cent
1949-50 to 1953-54.....	16,821	11,198	66.6	48	.3	.4
1954-55 to 1958-59.....	8,268	8,360	101.1	171	2.1	2.0
1959-60 to 1963-64.....	8,563	6,179	72.2	47	.5	.8
1964-65.....	10,800	7,347	68.0	178	1.6	2.4
1965-66.....	16,400	12,065	73.6	723	4.4	6.0
1966-67.....	15,700	10,967	69.8	1,096	7.0	10.0
1967-68.....	10,467	6,916	66.1	1,204	11.5	17.4
1968-69.....	11,400	3,838	33.7	674	5.9	17.6
1964-65 to 1968-69.....	12,953	8,227	63.5	775	6.0	9.4
1969-70.....	14,658			81	.6	

Sources: (1) *Annual Report of the Canadian Wheat Board*.

(2) *Quarterly Bulletin of Agricultural Statistics, Field Crops*, Cat. No. 21-003, Dominion Bureau of Statistics.

(3) *Handbook of Agricultural Statistics, Field Crops*, Cat. No. 21-501, Dominion Bureau of Statistics.

(4) *Annual Report of the Canadian Livestock Feed Board*.

TABLE 5—FEED GRAINS IN BRITISH COLUMBIA: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	189,157	244,160	222,772	117.8	411,929
1954-55 to 1958-59.....	162,952	219,740	214,510	131.6	377,462
1959-60 to 1963-64.....	196,029	251,980	214,104	109.2	410,133
1964-65.....	271,252	355,900	227,554	83.9	498,806
1965-66.....	274,564	319,900	239,225	87.1	513,789
1966-67.....	303,391	353,300	246,425	81.2	549,816
1967-68.....	203,931	356,400	269,225	132.0	473,156
1968-69.....	359,081	404,000	314,321	87.5	673,402
1964-65 to 1968-69.....	282,443	349,900	259,350	91.8	541,793
1969-70.....	302,162	405,300	339,676	112.2	641,838

^a Wheat, Oats, barley, rye, mixed grains.

TRENDS IN PROVINCIAL PRODUCTION AND USE

British Columbia

The acreage seeded to grains in British Columbia increased steadily during the past 10 years from about 220,000 acres to 405,000 acres, after having declined during the previous 10 years by about 30,000 acres (Table 5). Wheat acreage increased from 65,000 acres in 1959-60 to 160,000 acres in 1969-70, and barley acreage increased from 60,000 acres to 160,000 acres. Oats acreage declined more or less steadily from an average of 100,000 acres in the early 1950's to 76,000 acres in 1969. Rye and mixed grain acreages are relatively small and fluctuate considerably from year to year. Fodder corn acreage has been increasing during the past decade: in 1969, there were 11,000 acres.

During the 10 years preceding 1964-65, annual shipments of feed grain into British Columbia under freight assistance were relatively stable at about 214,000 tons. Since that time, shipments have been increasing in volume and in 1969-70, were 339,676 tons. As a proportion of provincial production, imports of feed grains declined from an average of 132 per cent in the late 1950's to about 92 per cent during the late 1960's. There was considerable variation from year to year. In 1967-68, provincial production was small because of unfavorable weather and, freight-assisted shipments to the Province were 132 per cent of provincial production. During 1964-65 to 1968-69, production of grains in British Columbia averaged 282,443 tons and imports to the province averaged 259,350 tons. The utilization of feed grains in British Columbia increased substantially during the latter half of the 1960's—from about 410,000 tons annually to 673,400 tons in 1968-69.

Ontario

In Ontario, the area seeded to grains has been decreasing in size. As for individual grain crops, the acreage seeded to winter wheat, spring wheat and oats have been declining, but barley, mixed grains, corn and soybeans acreages have been increasing. The upward trends in barley and mixed grain acreages occurred only in recent years. The downward trends in acreages of oats and wheat have been more or less continuous. Corn acreage, both for grain and fodder, has been increasing in recent years. In 1970, grain corn acreage in Ontario was estimated at more than one million acres compared with 450,000 acres in 1960. The production of grains, including corn, in Ontario increased from an average of 3.6 million tons during 1949-50 to 1953-54 to 4.7 million tons during 1964-65 to 1968-69 (Table 6).

The quantity of feed grain moving into Ontario under freight assistance declined during the 1960's from an annual average of more than one million tons to 618,655 tons in 1968-69. As a proportion of provincial production, feed imports declined from an average of 26.5 per cent during the late 1950's to 12 per cent in 1968-69.

Quebec

The acreage seeded annually to grains in Quebec has been decreasing steadily—only the acreages seeded to wheat and corn have shown any increase and that only in recent years. Oats continues to be the most important grain crop. Oats acreage decreased from an average of 1.4 million acres in the early 1950's to less than one million acres in 1969. During the same period, barley acreage decreased from some 60,000 acres to about 20,000 acres. Corn for grain has been

grown in Quebec for many years but the acreage was small and was not reported in crop statistics from the early 1930's to the late 1960's. However, corn seems to be gaining in popularity as a grain crop, and in 1969, acreage was reported at 45,000 acres. Fodder corn acreage increased during the past five years from what it was during the previous years, but it was not much different from that of the early 1950's. Total production of the principal feed grains averaged 870,967 tons during 1964-65 to 1968-69, down from 993,075 tons during 1949-50 to 1953-54 (Table 7).

The quantity of feed grain shipped to Quebec under freight assistance increased from an annual average of 945,667 tons in the early 1950's to 1,165,761 tons in the late 1960's. As a proportion of provincial production of feed grains, feed imports increased from 95 per cent to 134 per cent.

New Brunswick

Grain acreage in New Brunswick decreased more or less steadily from about 200,000 acres in 1949 to 94,000 acres in 1969. The acreages of all grain crops decreased, except wheat and mixed grains and these are not large acreages—3,700 acres of wheat and 8,500 acres of mixed grains in 1969. Oats has been the most important grain crop, but the acreage seeded decreased from 170,000 acres in 1949 to 69,000 acres in 1969. Production of the main grains declined from an annual average of 129,268 tons during 1949-50 to 1953-54 to 75,565 tons during 1964-65 to 1968-69 (Table 8).

The average annual shipment of feed to New Brunswick during the five years from 1964-65 to 1968-69 was larger than during the previous 10 years but smaller than during the five-year period

TABLE 6—FEED GRAINS IN ONTARIO: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE, APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	3,617,263	4,220	848,114	23.4	4,465,377
1954-55 to 1958-59.....	3,785,146	3,945	1,002,052	26.5	4,787,198
1959-60 to 1963-64.....	3,840,366	3,623	832,386	21.7	4,672,752
1964-65.....	4,482,091	3,634	739,142	16.5	5,221,233
1965-66.....	4,635,967	3,556	769,015	16.6	5,404,982
1966-67.....	4,423,990	3,539	893,560	20.2	5,317,550
1967-68.....	4,763,100	3,510	713,523	15.0	5,476,623
1968-69.....	5,113,377	3,467	618,655	12.1	5,732,032
1964-65 to 1968-69.....	4,683,705	3,541	746,779	15.9	5,430,484
1969-70.....	4,550,449	3,353	1,031,553	22.7	5,582,002

^a Winter wheat, spring wheat, oats, barley, mixed grains, shelled corn, rye, buckwheat.

TABLE 7—FEED GRAINS IN QUEBEC: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE, APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	993,075	1,727	945,667	95.2	1,938,742
1954-55 to 1958-59.....	914,585	1,585	1,067,387	116.7	1,981,972
1959-60 to 1963-64.....	979,785	1,417	1,006,768	102.8	1,986,553
1964-65.....	886,094	1,272	1,052,237	118.8	1,938,331
1965-66.....	773,579	1,248	1,167,994	151.0	1,941,573
1966-67.....	904,052	1,187	1,299,831	143.8	2,203,883
1967-68.....	878,253	1,212	1,185,102	134.9	2,063,355
1968-69.....	912,857	1,168	1,123,642	123.1	2,036,499
1964-65 to 1968-69.....	870,967	1,217	1,165,761	133.8	2,036,728
1969-70.....	879,656	1,184	1,293,929	147.1	2,173,585

^a Wheat, oats, barley, rye, mixed grains, buckwheat, and corn from 1966-67.

TABLE 8—FEED GRAINS IN NEW BRUNSWICK: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE, APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	129,268	191,220	90,472	70.0	219,740
1954-55 to 1958-59.....	103,158	149,600	84,427	81.8	187,585
1959-60 to 1963-64.....	86,356	119,240	83,152	96.3	169,508
1964-65.....	82,951	100,000	78,152	94.2	161,103
1965-66.....	72,520	103,100	82,821	114.2	155,341
1966-67.....	83,671	93,700	77,260	92.3	160,931
1967-68.....	66,351	97,300	94,553	142.5	160,904
1968-69.....	72,334	89,200	102,068	141.1	174,402
1964-65 to 1968-69.....	75,565	96,660	86,971	114.9	162,536
1969-70.....	78,060	94,200	105,591	135.3	183,651

^a Wheat, oats, barley, mixed grains, buckwheat.

TABLE 9—FEED GRAINS IN NOVA SCOTIA: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE, APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	53,314	71,900	127,794	239.7	181,108
1954-55 to 1958-59.....	44,421	57,580	132,365	298.0	176,786
1959-60 to 1963-64.....	34,918	46,660	134,514	385.2	169,432
1964-65.....	37,440	42,700	137,233	366.5	174,673
1965-66.....	29,689	39,900	161,664	544.5	191,353
1966-67.....	42,270	40,800	148,822	352.1	191,092
1967-68.....	31,526	45,000	152,665	484.2	184,191
1968-69.....	40,885	44,700	161,642	395.4	202,527
1964-65 to 1968-69.....	36,362	42,620	152,405	419.1	188,767
1969-70.....	45,674	46,200	172,072	265.4	217,746

^a Wheat, oats, barley, mixed grains.

1949-50 to 1953-54. As a proportion of provincial production, freight-assisted imports of feed grains increased from an average of 70 per cent during the early 1950's to an average of 115 per cent in late 1960's. In 1967-68 and 1968-69, provincial imports of feed grains under freight assistance were more than 140 per cent of provincial production. Utilization of feed grain in New Brunswick increased in 1968-69 and in 1969-70, but the total was still some 36 million bushels less than the average use during the early 1950's.

Nova Scotia

Grain acreage in Nova Scotia decreased from about 74,000 acres to about 45,000 acres during the past 20 years. Oats occupies the largest acreage of any grain

crop but its acreage has declined steadily from 62,000 acres to 24,000 acres. During the past five years, there was some increase in the acreage seeded to barley and mixed grains, but it is still not a large acreage. Annual grain production in Nova Scotia averaged about 36,000 tons in recent years and has varied from 30,000 tons to 45,000 tons (Table 9).

Freight-assisted shipments of feed grains to Nova Scotia have been increasing—from an annual average of 127,794 tons in the early 1950's to 152,405 tons during the years 1964-65 to 1968-69. As a percentage of provincial production, feed imports increased from 240 per cent to 419 per cent.

Provincial utilization of feed grains declined during the fifties and early sixties but, has been increasing since then. The apparent utilization in 1969-70 was 217,746 tons.

TABLE 10—FEED GRAINS IN PRINCE EDWARD ISLAND: PRODUCTION, IMPORTS UNDER FEED FREIGHT ASSISTANCE, APPARENT DISAPPEARANCE, 1949-50 TO 1969-70

Period	Provincial Production ^a	Provincial Acreage ^a	Freight-Assisted Shipments to Province		Apparent Disappearance in Province
			Quantity	Percentage of Provincial Production	
	tons	acres	tons	per cent	tons
1949-50 to 1953-54.....	132,001	174,300	28,845	21.8	160,846
1954-55 to 1958-59.....	123,555	158,820	25,875	20.9	149,430
1959-60 to 1963-64.....	135,016	154,820	26,222	19.4	161,238
1964-65.....	158,523	151,000	23,146	14.6	181,669
1965-66.....	112,327	151,500	38,573	34.3	150,900
1966-67.....	172,756	147,700	29,879	17.3	202,635
1967-68.....	118,810	149,600	39,852	33.5	158,662
1968-69.....	157,681	149,000	30,690	19.4	188,371
1964-65 to 1968-69.....	144,019	149,760	32,760	22.5	176,447
1969-70.....	168,137	153,500	28,428	16.9	196,619

^a Wheat, oats, barley, mixed grains.

Prince Edward Island

Grain acreage in Prince Edward Island has decreased from some 180,000 acres to about 150,000 acres during the past two decades. Oats, the most important grain crop, decreased from 100,000 acres to 71,000 acres. During the past decade, barley acreage has been increasing—from about 1,200 acres in 1960 to 20,000 acres in 1969. During the past decade, production of grains in Prince Edward Island increased from an average of about 124,000 tons to 145,000 tons (Table 10).

The quantity of feed grains shipped annually to P.E.I. under freight assistance was slightly larger during the years from 1964-65 to 1968-69 than in earlier five-year periods. The quantity shipped in 1969-70 was the smallest since 1964-65. As a proportion of provincial production, the freight-assisted shipments of feed grains have not changed appreciably, having been about 22 per cent in the early 1950's and 22.5 per cent in the five years from 1964-65 to 1968-69. In 1969-70 the proportion was only 17 per cent. The utilization of feed grains in Prince Edward Island fluctuates from year to year but trends in utilization are upward.

Newfoundland

The first shipment of feed grain from Western Canada to Newfoundland under the feed freight assistance program occurred in the crop year 1948-49.(1). From that time to the end of 1968-69, more than 403,000 tons of grain were shipped to Newfoundland. The assistance paid by the federal government on these shipments was more than \$9 million. In 1969-70, freight assisted shipments of feed grains to

Newfoundland were 35,197 tons, bringing the shipments since 1948-49 to more than 438,000 tons.

During the 1950's, annual shipments of feed to Newfoundland under the freight assistance program averaged about 18,000 tons. From 1960-61 to 1962-63, they were just more than 20,000 tons a year. In 1963-64, the shipments increased to almost 29,000 tons and remained at about that level until 1968-69 when they were more than 38,000 tons.

Crop production in Newfoundland is very small. In 1966, there were only 49,513 acres in farms in the province (4). There were 20,566 acres of improved land of which 12,409 acres were in crops. The potential for increasing the cropland area in Newfoundland is virtually nil. Any livestock production in the province must depend largely upon imports of feeds.

SUMMARY

From 1949-50 to 1969-70, the average annual quantity of grains shipped under the feed freight assistance program was about 2.4 million tons.

The quantity of wheat shipped under the feed freight assistance program is a relatively small proportion of wheat production in the Prairie Provinces. There is no definite trend toward an increase, although shipments did increase substantially in 1969-70.

Eastern Canada and British Columbia are important markets for oats grown in the Prairie Provinces. About 15 per cent of the production, about 87 per cent of producers' marketings, is shipped to these markets under the feed freight assistance program. The Eastern Canada and British Columbia feed grain markets are important outlets for barley produced in the Prairie Provinces. About 15 per cent of the barley

grown in the Prairie Provinces, about 38 per cent of the producers' marketings, is shipped to these markets under the feed freight assistance program.

The quantity of rye shipped from livestock feed is relatively small. However, in recent years, six per cent of production in the Prairie Provinces, about 11 per cent of producers' marketings, has been shipped under the feed freight assistance program.

The quantity of grain shipped to British Columbia under the feed freight assistance program is about the same as that produced in that province. The utilization of feed grain in British Columbia is increasing and the demand is being met by both increased production within the province and by increased imports from the Prairie Provinces under the freight assistance program.

Although the utilization of feed grains has been increasing in Ontario, this province has not been a growing market for grain shipped under the feed freight assistance program. The quantity shipped to Ontario under the program is about 15 per cent of the provincial production.

The utilization of feed grains in Quebec increased during the recent years. Provincial production has been declining but the quantity shipped to Quebec under freight assistance from Western Canada has been increasing. During the past five years, freight-assisted shipments averaged some 130 per cent of provincial production.

Grain production in New Brunswick has been declining but shipments to the province under the feed freight assistance show little change. The average quantity of feed grain shipped to New Brunswick under the program during recent years was about 115 per cent of provincial production.

Nova Scotia depends heavily on grain shipped from Western Canada. During the past five years, western feed grains shipped to Nova Scotia under the feed freight assistance program were almost 420 per cent of provincial production. Production of feed grains

within Nova Scotia has been declining and imports from Western Canada have been increasing.

Although the acreage seeded to grains in Prince Edward Island has been decreasing, production has been increasing. The quantity of feed grain obtained under the feed freight assistance program is equal to about a fifth of provincial production and, on the average, this proportion has changed little during the past 20 years.

Little grain is grown in Newfoundland and the potential for increase is small. Feed shipped under the freight assistance program undoubtedly is a large part of the inputs of the livestock industry in Newfoundland.

NOTES AND REFERENCES

- (1) *Annual Report of the Canadian Livestock Feed Board, Crop Year, 1968-69*, Canadian Livestock Feed Board, P.O. Box 2250, St. Laurent Postal Station, Montreal 379, Quebec.
- (2) At time of writing, the expenditures under the feed freight assistance program of 1969-70 were not available.
- (3) In 1969-70, slightly more than three million tons of feed grains were shipped under the program, bringing the total shipped since the institution of the program to 71.5 million tons. (See "Grain Facts" No. 23, September 4, 1970, Canadian Livestock Feed Board, P.O. Box 2250, St. Laurent Postal Station, Montreal 379, Quebec). The percentages shown in this paragraph are not changed appreciably by the 1969-70 shipments.
- (4) *Annual Reports of the Canadian Wheat Board*, The Canadian Wheat Board, 423 Main Street, Winnipeg 2, Manitoba.
- (5) *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003, Dominion Bureau of Statistics.
- (6) *Census of Canada, Agriculture, 1966*, Dominion Bureau of Statistics.
- (7) Kerr, T. G. *An Economic Analysis of the Feed Freight Assistance Policy*, Agricultural Economic Research Council of Canada, Ottawa, Publication No. 7, 1966.
- (8) Lerohl, M. L., MacEachern, G. A., and Vandermeulen H., *Grain and Feed Transportation Benefits and Burdens*, Agricultural Economics Research Council of Canada, Ottawa, 1970.

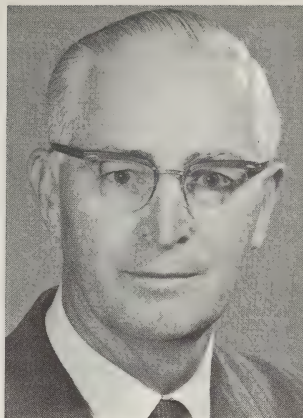
CHANGES IN LAND USE AND FARM ORGANIZATION IN THE PRAIRIE AREA OF SASKATCHEWAN DURING THE PERIOD 1951 TO 1966

"Farmers on . . . good . . . land have increased their acreage the most . . ."

"In 1951 in Saskatchewan there were 35 cattle per farm on the poor land of the Brown Soil Zone" . . .

"this number increased to 116 cattle per farm by 1966 . . . !"

"The poorer the land the greater the increase in cattle numbers per farm . . . as well, income may be increased by \$3.00 per acre or more!"



R. A. Stutt*

INTRODUCTION

In the prairie area of Saskatchewan, a number of important and effective changes in land use and farm organization have taken place during the last two decades. These adjustments have served to enhance the inherent physical and economic capabilities of the land resource. As a result, it is believed that a larger proportion of farmers are attaining a higher degree of stability in agricultural production, financial security and a level of living comparable to that of urban dwellers.

Despite periodic setbacks because of climatic conditions and marketing problems, there is a tendency to forget or to downgrade the amount of progress by farmers.

Purpose of Study

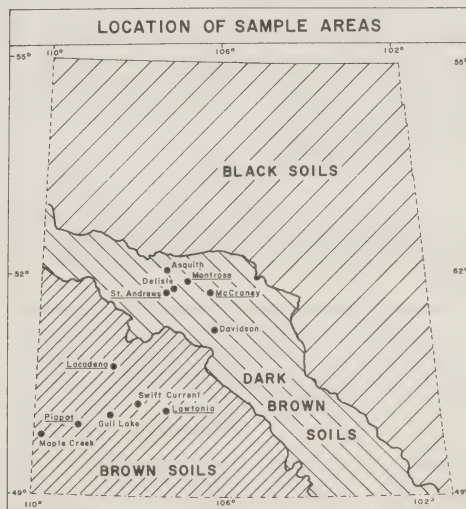
The purpose of this article is to show that change has taken place on Saskatchewan prairie farms during 1951-1966.

METHOD OF ANALYSIS

The study was done by using Census data for a selected group of rural municipalities (1) representative of poor, medium and good grades of land in the Brown and Dark Brown Soil Zones of Saskatchewan. The statistics were drawn from the 1951, 1961 and 1966 Censuses, supplemented by the series of farm organization studies conducted by the Economics Branch during the 1951-1966 period.

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Indicators selected deal with land use, size of farms, number of farms, livestock numbers, types of farms, economics of farm classes, land tenure, farm population, age of farm operators, farm operator residence and off-farm employment. Some additional data for the period since 1966 from economic studies carried out by the Economics Branch were also used to provide the latest information available at time of writing.



Farms in the rural municipalities chosen for this study are located on land representative of each land class based on their suitability for wheat production which has been considered to be the most profitable

TABLE 1—TOTAL ACREAGE AND PERCENTAGE OF ACREAGE IN EACH LAND CLASS, REPRESENTATIVE MUNICIPAL UNITS, PRAIRIE AREA OF SASKATCHEWAN.

	Rural Municipality Name	No.	Total Acreage	Land Classes				
				I	II	III	IV	V
—percent—								
Brown Soil Zone								
Poor grade.....	Piapot	110	205,183	74.2	14.8	10.1	0.9	—
Medium grade.....	Lawtonia	135	206,093	11.1	15.9	55.6	17.4	—
Good grade.....	Lacadena	228	288,009	20.4	6.5	11.6	20.1	41.4
Dark Brown Soil Zone								
Poor grade.....	Montrose	315	217,803	59.5	18.3	19.7	2.5	—
Medium grade.....	McCraney	282	235,086	31.4	27.9	40.7	—	—
Good grade.....	St. Andrews	287	204,096	6.3	3.7	6.1	14.3	69.6

Source: *An Economic Classification of Land*, Unpublished data, Economics Branch, Canada Department of Agriculture 1937-1951.

land use (2). The rural municipality selected to represent a specific land class had a predominance of the land area in that particular category. For this study, a modification was used whereby the selected rural municipalities were assembled into three broad grades of land—poor, medium and good. Under this grouping, land rated as Land Classes I and II (sub-marginal and marginal) was designated as poor; land rated as Land Class III (fair wheat land), as medium; and land in Land Classes IV and V (good and excellent wheat land), as good. The grouping is shown in Table 1. This abbreviated study approach was used in an attempt to portray the wide variability in soil capability and economic productivity of farming that exists in this area of Saskatchewan. Using this approach in the study, it was thus possible to show the range, scope and effects of changes on each specific grade of land.

TABLE 2—AVERAGE WHEAT YIELDS IN RURAL MUNICIPALITIES REPRESENTATIVE OF POOR, MEDIUM AND GOOD WHEAT LANDS, SASKATCHEWAN, 1918 TO 1969.

	Brown Soil Zone			Dark Brown Soil Zone		
	Grade of Land					
Period	Poor	Medium	Good	Poor	Medium	Good
	—bushels per acre—					
Average						
1918 to 1930 . .	13.0	14.8	14.9	11.3	13.4	18.1
1931 to 1940 . .	7.2	4.9	10.3	8.2	8.9	14.7
1941 to 1950 . .	7.3	11.1	12.7	10.7	13.0	16.4
1951 to 1960 . .	16.3	20.7	20.8	15.3	17.7	23.8
1961 to 1969 . .	15.1	17.8	20.6	16.6	17.9	22.8
1918 to 1969 . .	11.8	13.8	15.7	12.3	14.0	19.0

Source: *Supervisor of Statistics*, Saskatchewan Department of Agriculture.

Level of Physical Productivity

Evidence of the level of physical productivity of the selected municipal units is provided by information on wheat yields (Table 2). Wheat yields in the 1951-1960 and 1961-1969 periods are considerably above those of previous decades.

Number of Farms and Farm Population

The number of farms in the representative municipal units follows a general downward trend. Between 1951 and 1966, in the Brown Soil Zone, the number decreased by 21.1, 22.5 and 20.5 percent in the poor, medium and good grades of land, respectively. In the Dark Brown Soil Zone, decreases of 13.1, 22.2 and 21.8 percent occurred in the comparable grades of land during the same period.

Farm population also decreased during the same years. This reduction was about 25 percent on all grades of land except in good grades of land in the Dark Brown Soil Zone, where the overall population decrease was 34.5 percent in the 1951-1966 period. The total percentage decline in population was similar to the total percentage decline in farm numbers for each grade of land, except in the Rural Municipalities of Montrose (no. 315) and St. Andrews (no. 287). Here, the population decline was greater. This was probably due to the close proximity of larger urban centers.

This picture suggests the attainment of a favorable trend in farm size, population stability, increased farm size and greater income-earning capacity. In the case of the poorer grades of land, most of the farm depopulation occurred during the 1930's and 1940's. In the representative municipal units, the decrease in farm population from 1951 to 1966 was 14.0 and 21.7 percent on poor lands, 23.7 and 23.6 percent on me-

TABLE 3—IMPROVED LAND USE IN REPRESENTATIVE RURAL MUNICIPALITIES IN SASKATCHEWAN, 1951, 1961 AND 1966.

	Percentage of total improved land								
	Under crops			Wheat			Improved pasture and tame hay		
	1951	1961	1966	1951	1961	1966	1951	1961	1966
Brown Soil Zone									
Poor grade.....	72.7	60.8	63.3	37.7	29.0	31.5	9.3	12.9	21.6
Medium grade.....	56.1	53.0	53.0	47.3	45.2	48.8	1.7	2.1	2.6
Good grade.....	63.1	55.8	59.7	54.6	42.6	50.5	2.5	2.2	3.8
Dark Brown Soil Zone									
Poor grade.....	70.1	58.3	63.8	39.0	32.3	34.5	8.5	13.2	14.5
Medium grade.....	53.2	53.5	57.3	46.3	42.9	50.7	4.4	3.7	2.7
Good grade.....	55.0	54.0	57.5	49.8	34.0	47.3	3.4	1.8	2.3

Source: *Census of Canada (Agriculture)*.

dium lands, and 24.2 and 34.5 percent on good lands in the Brown and Dark Brown Soil Zones, respectively. Changes in farm numbers and farm population have served to facilitate desirable adjustments to resource capacity and farm family needs through a more appropriate ratio of the population to land resources.

Changes in Land Use

Little change took place in the amount of occupied farm land from 1951 to 1966. The total area of improved land increased slightly and also as a percentage of occupied farm land. In 1966 the improved land area was 37.2 and 59.2 percent of occupied farm area for poor lands, 87.0 and 81.8 percent for medium lands, and 75.0 and 93.1 percent for good lands in the Brown and Dark Brown Soil Zones, respectively. Important changes, however, have taken place in the use of improved land (Table 3).

First, there was a drop in the proportion of improved land under crops (3), especially in the Brown Soil Zone. This was most apparent on the poorest grade of land. Some of the decrease can be attributed to an increase in summerfallow and a general adoption of a two year summerfallow-crop rotation system on the medium and good lands while a three year summerfallow-crop rotation took place on poorer lands.

Second, there was a reduction in the proportion of improved land used for wheat (4). The most significant reduction occurred on the poorer grades of land. This was due to a considerable shift and an encouraging increase in the proportion of improved land devoted to grass for pasture or hay purposes on the poorer grades of land. These kinds of land use adjustments have long been advocated as desirable shifts from a "one-crop" type of agricultural economy and as improved conservation practices.

TABLE 4—LAND USE, RURAL MUNICIPALITIES REPRESENTATIVE OF POOR, MEDIUM AND GOOD GRADES OF LAND IN SASKATCHEWAN. 1951, 1961 AND 1966.

	Total farm area			Total improved area			Area under crops			Area under wheat			Area under improved pasture and tame hay		
	1951	1961	1966	1951	1961	1966	1951	1961	1966	1951	1961	1966	1951	1961	1966
acres per farm															
Brown Soil Zone															
Poor grade.....	1,244	1,505	1,568	438	524	582	318	318	369	165	152	184	48	67	162
Medium grade..	599	665	755	491	560	657	275	297	348	232	253	321	10	12	17
Good grade....	769	929	1,050	571	695	788	360	388	470	311	296	398	16	15	30
Dark Brown Soil Zone															
Poor grade.....	816	1,003	1,052	464	595	623	325	347	398	181	192	216	46	79	90
Medium grade..	672	763	861	497	611	704	264	327	404	230	262	357	25	23	19
Good grade....	609	803	846	572	759	788	315	410	454	285	258	373	24	14	18

Source: *Census of Canada (Agriculture)*, 1951, 1961, 1966.

Size of Farm

In terms of total occupied area, farms on the poorest grade of land are considerably larger than on other grades of land but have a smaller proportion of improved land. Conversely, more unimproved land is found on the poorer grades of land and thus is available for livestock grazing (Table 4).

Associated with the decrease in the number of farms, largely through a consolidation process, there has been a significant increase in the average size of farm. If reliance can be placed on the above data for the selected municipal units, it can be concluded that farms on the good grade of land have increased in acreage more than farms on poorer land. During the 1951-1966 period, farms on good land increased over one-third in size compared with slightly more than one-quarter for farms on poor and medium grades of land.

These changes, and changes to enterprises more suited to land capability, along with increased use of credit and better management practices, indicate progress toward the aim of attaining appropriate economic commercial farm units.

Livestock on Farms

Other important changes in the area of farm organization and management have been made in livestock enterprises. A comparison of livestock numbers on farms in 1951, 1961 and 1966 shows relatively large increases in cattle, mainly beef type, and a slight increase in the hog population. On the Brown Soil Zone, total cattle per farm on the poor grade of land numbered 93 and 116 in 1961 and 1966, respectively, compared to 35 in 1951. In the case of municipal units with medium and good grades of land in this soil zone, 1961 numbers were 19 and 26, and 18 and 23 in 1966, compared with 8 and 9, respectively, in 1951.

Similar, though less pronounced, increases took place in the Dark Brown Soil Zone. In all the selected municipal units, cattle numbers doubled from 1951 to 1961. During 1951-1966, cattle numbers doubled on farms in the poor and medium grades of land and increased by two-thirds in the good grades of land. The expansion in cattle numbers has been abetted and supported by the extension and development of Prairie Farm Rehabilitation Administration (PFRA). Agricultural and Rural Development (ARDA) and



TABLE 5—DISTRIBUTION OF FARMS, CLASSIFIED BY ECONOMIC CLASS FOR RURAL MUNICIPALITIES REPRESENTATIVE OF POOR, MEDIUM AND GOOD GRADES OF LAND, SASKATCHEWAN, 1966.

Number of farms	Brown Soil Zone			Dark Brown Soil Zone		
	Grade of Land			Grade of Land		
	Poor	Medium	Good	Poor	Medium	Good
Census.....	131	276	416	199	264	262
Commercial.....	114	258	381	149	243	242
Small scale and Institutional.....	17	18	35	50	21	20
Percent						
Total value of products sold						
\$35,000 and over.....	—	—	1.7	—	1.1	1.5
25,000 to \$34,999.....	3.8	0.7	1.4	—	3.0	5.0
15,000 to 24,999.....	11.5	12.7	14.2	7.0	17.8	26.7
10,000 to 14,999.....	17.6	26.8	24.8	11.6	22.3	24.4
7,500 to 9,999.....	20.6	18.9	18.8	19.6	13.3	13.8
5,000 to 7,499.....	19.8	18.1	16.3	15.1	20.5	11.8
3,750 to 4,999.....	5.3	7.6	9.4	8.5	5.3	8.4
2,500 to 3,749.....	8.4	8.7	5.0	13.1	8.7	0.8
Commercial farms.....	87.0	93.5	91.6	74.9	92.0	92.4
Total value of products sold						
\$1,200 to \$2,499.....	6.1	5.4	7.4	10.6	3.8	4.6
250 to 1,199.....	3.1	1.1	0.5	9.5	2.3	1.9
50 to 249.....	3.0	—	0.5	3.5	1.5	1.1
Small scale farms.....	13.0	6.5	8.4	25.1	8.0	7.6
Institutional farms etc.....	0.8	—	—	1.5	0.4	—

Source: *Census of Canada (Agriculture)*, 1966.

provincial community pasture programs as well as individual farmer's projects for farm improvement and diversification. All these adjustments point to an appropriate use of lands normally considered to be sub-marginal for wheat and other grain crop use.

Economic Classification of Farms

Commercial farms, defined in the 1966 Census as having a total annual value of agricultural products sales of \$2,500 or more, predominate in the prairie area, as throughout Saskatchewan. In the 1966 Census, all census farms, with the exception of institutional farms, were classified into eleven economic classes based upon the gross income received from sales of agricultural products during the previous twelve months (Table 5). The classification of census farms into economic classes presents a measure of the productive size of the holdings. This system does not provide a stable long-term measure but only represents the situation with respect to production and prices of agricultural products during the 1965-66 census year.

Although there are a number of commercial farms in the relatively low income categories, the majority had incomes of \$7,500 or more. The average annual gross farm income in 1966 (1965 crop year), for all census farms was \$9,185, \$9,226 and \$10,846 for the

representative municipal units in the Brown Soil Zone for poor, medium and good grades of land. This compares with \$6,430, \$10,439 and \$12,702 for the respective municipal units and grades of land in the Dark Brown Soil Zone. These figures exceeded the 1961 figures (1960 crop year) by a range of 22 to 64 percent for the respective grades of land. The average annual gross farm income on the poorest lands was \$7,524 compared with \$9,819 and \$11,565 for the medium and good grades of land, respectively, in 1966. The provincial average was \$8,536. Since these data pertain to a relatively recent normal crop year (1965), and since the price factor is constant for all grades of land, these income relationships may be considered representative of an average situation over a period of years. Other information presented in this article indicates the growing importance of income from sources other than wheat, especially on the poorest grades of land. This has helped to improve its income position relative to other grades of land.

Type of Farm

Further evidence of the diversification of farm enterprises is shown in Table 6 for commercial farms in the representative municipal units. These farms are classified in the 1966 Census according to the dominant source or kind of farm income.

TABLE 6—COMMERCIAL FARMS CLASSIFIED BY TYPE, REPRESENTATIVE MUNICIPAL UNITS, SASKATCHEWAN, 1966.

	Brown Soil Zone			Dark Brown Soil Zone		
	Grade of Land					
	Poor	Medium	Good	Poor	Medium	Good
	percent					
All commercial farms.....	100.0	100.0	100.0	100.0	100.0	100.0
Dairy.....	—	—	—	0.7	—	—
Cattle, hogs, sheep (excluding dairy farms).. <td>46.4</td> <td>1.9</td> <td>5.2</td> <td>18.1</td> <td>3.3</td> <td>1.2</td>	46.4	1.9	5.2	18.1	3.3	1.2
Poultry.....	—	—	0.3	—	0.4	—
Wheat.....	36.0	95.7	91.1	61.7	92.6	90.5
Small grains (excluding wheat farms).....	12.3	1.6	2.6	16.8	2.1	7.9
Field crops, other than small grains.....	—	—	—	—	—	—
Fruits and Vegetables.....	—	—	—	—	—	—
Forestry.....	—	—	—	—	—	—
Miscellaneous specialty.....	—	—	—	0.7	—	—
Mixed.....	5.3	0.8	0.8	2.0	1.6	0.4
Livestock combination.....	4.4	0.4	0.4	0.7	0.4	—
Field crops combination.....	0.9	—	0.3	—	—	—
Other combination.....	—	0.4	0.3	1.3	1.2	0.4
Number of commercial farms.....	114	258	381	149	243	242

Source: *Census of Canada*, Dominion Bureau of Statistics, 1966.

During the last two decades, there has been a considerable change in farm type and sources of income. The farmer, generally had been following a one-crop wheat economy. For instance, almost one half of all commercial farms in the poor land of the Brown Soil Zone were classified as livestock (mainly beef cattle) farms in 1966. Here only about one-third of the farms were classified as wheat farms compared with 62 percent in the poor land of the Dark Brown Soil Zone and more than 90 percent in all other groups. In the prairie area there has been a polarization of farm type or specialization in terms of grain (mainly wheat) and grain-livestock (mainly cattle) farms. At the same time, a number of commercial mixed or small grain (excluding wheat) farmers continued to diversify on the poorer grades of land.

Tenure

Private ownership of land in the past was the main objective of most farmers in this region. It is usual now, however, to find the farm operator and his family operating owned lands and in many cases renting additional land. The practice of renting additional land is a common method used to enlarge the size of farm and increase the volume of business and income. The capital investment in land is thus restricted and permits the use of scarce capital for other inputs.

The group classed as part owner-part tenant made up 47, 38 and 41 percent of all farm operators on poor, medium and good grades of land, respectively, in

1966. They exceeded the number of owners on the poor lands and there were three owner-renters for every four owners on the other two grades of land. The trend to part owner-part tenant has been accelerating since 1951.

Off-farm Employment

A comparison of the 1966 and 1961 Census data indicates farm operators in the prairie area, especially those in the Dark Brown Soil Zone, are devoting an increasing amount of time to, and are obtaining more income from off-farm work. In the Brown Soil Zone, in 1966 farmers reported 9.5, 25.7 and 28.8 days of off-farm work compared with 11.8, 25.1 and 18.4 days in 1961 for those on poor, medium and good grades of land, respectively. In the Dark Brown Soil Zone, farmers in 1966 reported 36.3, 27 and 40.2 days compared with 16.6, 14.6 and 18.5 days in 1961 for those on poor, medium and good grades of land, respectively.

These data suggest that off-farm work can be an important source of extra income under certain conditions and circumstances. In the prairie area of Saskatchewan, however, this source of income is generally restricted by the relative lack of service or industrial employment opportunities in rural areas and nearby urban centres, compared with other parts of Canada. Off-farm work is, of course, restricted by on-farm labor requirements depending on the size and type of farm, age of operator, family sources

of labor, and the commuting distance between the farm and the job site. In many cases, the opportunity for additional income from off-farm work is enhanced by residence off the farm during all or part of the year. Information from the farm organization studies of the Economics Branch show that off-farm employment was most prevalent among the operators of small-size farms. Between one-quarter and one-half of the operators of half-section (320 acres) farms on poor and medium grades of land had off-farm employment.

Age of Farm Operator

It is often assumed that farmers on the poorer grades of land are older than those on the better grades of land. An examination of data from both the 1961 and 1966 Census does not confirm this belief. Little difference is noted in the distribution of farmers by age groups in the representative rural municipalities. In each municipal unit, about one-half of all farmers were in the 35 to 55 age group.

The proportion of farmers in the younger age groups (up to 35 years) was 17 percent and those in the older age groups (60 years and over) was 20 percent

in the representative rural municipalities of each soil zone. There was little difference in the proportions in each age group between grades of land of each soil zone.

Residence of Farm Operators

The 1966 Census shows the distribution of farm operators according to the number of months of residence on the farm. On all grades of land, at least three-quarters of all farm operators resided on their farms for more than nine months during the year. Off-farm residence was most common on the medium and good grades of land of both soil zones, being 22.1 and 20.1 percent, and 27.6 and 28.6 percent of all operators, respectively. In the case of the poor grade of land, the percentage was 13.0 and 19.1 for the Brown and Dark Brown Soil Zones, respectively.

These data are confirmed by information assembled in the farm organization studies. These studies also indicate that operators of small-size farms (about one-half of the sample) reside in a town or city and thus are in a position to pick up other types of employment and additional income. Most off-farm employment was in service industries.

TABLE 7—AVERAGE LAND USE, FARM CAPITAL, AND NET RETURNS, POOR AND MEDIUM GRADES OF LAND, ONE-SECTION GRAIN FARMS AND TWO-SECTION GRAIN CATTLE FARMS, BROWN SOIL ZONE AND DARK BROWN SOIL ZONE, SASKATCHEWAN.

SIZE OF FARM—		ONE SECTION GRAIN FARMS								TWO SECTION GRAIN CATTLE FARMS							
SOIL ZONE—		BROWN SOIL				DARK BROWN SOIL				BROWN SOIL				DARK BROWN SOIL			
GRADE OF LAND—		POOR		MEDIUM		POOR		MEDIUM		POOR		MEDIUM		POOR		MEDIUM	
		per farm	per improved acre	per farm	per improved acre	per farm	per improved acre	per farm	per improved acre	per farm	per improved acre	per farm	per improved acre	per farm	per improved acre	per farm	per improved acre
LAND USE (acres)																	
Total Area.....		657		688		668		627		1,216		1,285		1,292		1,199	
Improved.....		553		583		556		598		594		1,016		951		1,049	
Wheat.....		239		276		255		330		231		418		332		515	
Summerfallow.....		262		267		229		234		219		450		328		435	
FARM CAPITAL (dollars)																	
Real Estate.....		21,669	39.18	21,970	37.69	20,561	36.98	37,750	63.13	28,150	47.39	42,190	41.53	36,644	38.53	60,242	57.53
Machinery.....		7,742	14.00	8,695	14.91	9,710	17.46	13,692	22.89	8,583	14.45	16,612	16.35	14,166	14.90	22,780	21.71
Livestock.....		647	1.17	967	1.66	946	1.70	365	0.61	10,185	17.15	8,264	8.13	6,823	7.17	8,089	7.71
Total.....		30,058	54.35	31,632	54.26	31,217	56.14	51,807	86.63	46,918	78.99	67,066	66.01	57,663	60.60	91,111	86.85
NET RETURNS (dollars)																	
Return to operator for labor and capital ¹		3,385	6.12	5,682	9.74	4,151	7.47	4,970	8.31	5,807	9.78	10,149	9.99	7,527	7.92	9,164	8.73
Return to operator labor ²		1,882	3.40	4,100	7.03	2,590	4.66	2,380	3.98	3,461	5.83	6,796	6.69	4,645	4.88	4,608	4.39
Return to capital ³		24	0.04	2,529	4.34	887	1.60	1,054	1.76	2,109	3.55	6,288	6.19	3,734	3.93	4,462	4.25
Study Year.....		1963		1961		1962		1964		1963		1961		1962		1964	
Study Area.....		Gull Lake		Swift		Asquith		Davidson		Gull Lake		Swift		Asquith		Davidson	
		Maple Creek		Current		Deleise						Current		Deleise			

¹ Crop sales were calculated on the basis of average wheat yields for the 1947—1966 period assuming land use, grades and prices as in the study year.

² The allowance for interest on farm capital was calculated at the rate of 5 per cent; management allowance for the operator at 2 per cent of farm capital; and operator's labor at \$2,520, \$2,640, \$2,760, \$2,880 and \$3,000 in 1961, 1962, 1963, 1964 and 1965 respectively. The operator's labor was based on the current cost of hired farm labor.

Source: *Organizational Characteristics of Grain Farms in the Prairie Provinces*, Pub. No. 69/9, Economics Branch, Canada Department of Agriculture, 1956—1965.

Income Comparisons

Data on land use, enterprise organization, labor, crop production, cultural practices, and livestock operations are available from farm surveys. These surveys were done on grain and grain cattle farms in the prairie area of Saskatchewan in 1956-1965 by the Economics Branch. The records also provide a financial picture of the capital investment and input-output relationships dealing with sources and amount of income and perquisites, cash operating expenses, depreciation, and measures of financial success.

In general, these data reveal relatively satisfactory returns to the typical farm operator and family for labor and capital after deductions are made for cash operating expenses and depreciation, taking into account a normal yield and farm price situation for the grades of land involved.

Table 7 provides, in summary form, the pertinent data (5) for one-section (approximately 640 acres) grain farms and two-section (approximately 1,280 acres) grain cattle farms for the grades of land included in the series of farm organization studies during the period.

Returns to labor and capital for grain farms were \$6.12 and \$9.74 per improved acre on poor and medium grades of land in the Brown Soil Zone. This compares with \$7.47, \$8.31 and \$11.76 on poor, medium and good grades (6) of land in the Dark Brown Soil Zone. Similarly for grain-cattle farms, returns to labor and capital were \$9.78 and \$9.99 on poor and medium grades of land in the Brown Soil Zone compared with \$7.92 and \$8.73 in the Dark Brown Soil Zone.

Farmers on medium grade land or on poor grade Dark Brown soil apparently gained little extra return by adding a beef enterprise to their farm. On the other hand, farmers on poor grade Brown Soil Zone land increased their income from \$6.12 to \$9.78 per improved acre with the addition of an economic beef operation.

Surprisingly, grain farms on the medium quality Brown Soil Zone produced more profit per acre than similar farms on the Dark Brown Soil Zone. Among the reasons for this is that these farms are lower in capital value per acre than farms on the Dark Brown soil, and hence, carry lower interest charges. Since costs of production are lower, farmers on medium grade land on the Brown Soil Zone realized higher returns to labor and investment than farmers on the Dark Brown Soil Zone. This is true for grain farmers and cattle grain farmers alike.

A study of 50 commercial wheat farms in the Elbow-Hawarden area (loam soils) (7) of the Dark Brown Soil Zone in 1968 indicated returns to the operator and family for labor and capital comparable with returns obtained in previous years. Assuming 1963-1967 average wheat yields and grades and 1968 wheat prices, returns to the operator and family for labor and capital on farms with 480 to 640 improved acres averaged \$5,107 or \$8.63 per improved acre compared with \$10,327 or \$9.54 per improved acre for farms with 800 to 1,440 improved acres and \$21,466 or \$8.64 per improved acre for farms with 2,000 to 3,200 improved acres. Similar information for grain cattle farms in the prairie area since 1966 is not available.

SUMMARY AND CONCLUSIONS

This appraisal points to a number of structural factors and production adjustments that have changed the pattern of farming in the prairie area of Saskatchewan in the 1951 to 1966 period. These phases have a meaningful relationship with the broad farmer goals of net income maximization and attainment of a level of living comparable with entrepreneurs outside the agricultural industry. It must not be concluded, however, that the process of adjustment was fully satisfactory or widespread in all cases during the period. The analysis gives a sense of direction to the kinds of adjustments and to the quickening of pace required to meet changing socio-economic and market conditions since 1966.

Important highlights include, fewer but larger commercial farm units with concentration on specialization, economies of scale and increased volume of business; a polarization towards two main specialty farm types, i.e. grain (mainly wheat) on the better grades of land and grain cattle on the poorer grades of land, together with some enterprise diversification on mixed farms; a trend to a decreasing proportion of improved land devoted to field cash crops and a slowly increasing proportion used for improved pasture and tame hay; an increasing emphasis on livestock production, mainly beef cattle when it is possible to dovetail the enterprise effectively with an adequate feed and water base and labor supply; a process of farm enlargement effected primarily through the renting of additional land and a part owner-part tenant type of land tenure; and improved labor utilization and total income through increased off-farm employment during the slack farming season. These basic changes have been made possible through increased adoption of new technology and mechanization and improved farm management knowledge and ability.

NOTES AND REFERENCES

- (1) The selection of representative municipal units was facilitated by their inclusion in a series of change in farm organization studies that were underway from 1956 to 1968. These studies in Saskatchewan represent farms of grain and grain-cattle types subdivided into small, medium and large size categories. Samples of farms are included from light, medium and heavy textured soils of each soil zone.
- (2) During the period from 1937 to 1951, the Economics Branch carried out a program of an economic classification of land in Saskatchewan and covered all of the Brown and Dark Brown Soil Zones (39.1 million acres). Each quarter section was rated on a comparative budgetary basis in terms of its wheat-yielding and net income-earning capacity. The classification system included five classes ranging from Land Class I (submarginal for wheat production) to Land Class V (excellent wheat land). Coloured land class maps and statistical summaries are available from the Economics Branch.
- (3) There was a slight increase in the proportion of improved land under crops in the rural municipalities representing the medium and good grades of land in the Dark Brown Soil Zone.
- (4) A very moderate increase in the proportion of improved land and acres per farm devoted to wheat was noted in both municipalities representing a medium grade of land.
- (5) The data discussed here deal only with one selected size of farms for each product type. Similar information for both smaller and larger farms are found in the two reports cited at the foot of the tables.
- (6) Farm capital on grain farms in the Rosetown—Elrose area (good grade of land) averaged \$90,742 compared with \$31,217 and \$51,807 on poor and medium grades of land. The major share of the capital investment was, of course, in real estate, and averaged \$124.01 per improved acre in the Rosetown-Elrose area compared with \$36.98 and \$63.13 in the poor and medium grades of land, respectively.
- (7) *Costs and Returns, Commercial Wheat Farms, Prairie Provinces, 1968*. B. Middlemiss and M. Ragush, Economics Branch, Canada Department of Agriculture. 69/12.

WINTER FEED PRODUCTION ON GRAIN CATTLE FARMS IN SASKATCHEWAN



J. K. Wiens*

*"The market price of wheat has a major bearing on the profitability of beef enterprises on Saskatchewan grain farms".
"Winter fodder for beef enterprises is one of the largest costs of beef production".*

Should arable wheat land be used as a source of fodder in Saskatchewan?

The authors examine the effects of the costs of straw, grain hay, and grass-legume hay grown on arable wheat land in beef enterprises.

The results of this study have a bearing on farmers' management decisions.



M. R. Kilcher**

In the Brown and Dark Brown Soil Zones of Saskatchewan, cattle production has developed on grain farms as a supplementary enterprise to use the unimproved acreage not suitable for grain production. On such grain-cattle farms, some shifts have also occurred in the overall use of the arable land. Although arable land is used principally for cereal grain production, some of this arable land is used as one of the sources of winter feed or for early spring and late fall grazing. Thus, the cattle enterprises have evolved both as supplementary and competitive farm enterprises to cereal grain enterprises. Although cattle production can be regarded as supplementary to cereal production, there is no evidence that cattle enterprises are complementary — increase total grain production.

In the context of the structure of these grain-cattle farms, the economics of the winter feed production becomes important.

The purpose of this study is to determine the change in farm costs when fodder is produced on part of the arable acreage of wheat farms and to determine the difference in cost of production between cereal grain hay and perennial forage hay.

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The authors collaborated for an interdisciplinary treatment of the subject.

Effects of Cattle Enterprises on Farm Income

Comparisons were made between groups of grain farms and grain-cattle farms on the same soil type that had about the same number of improved acres. Data on 16 groups of farms (1) are summarized in Table 1. These groups are divided into eight pairs or sets, according to the average amount of unimproved acres and the number of cattle on the farms.

Considering all eight sets of farms in Table 1, the average return on the grain-cattle farms was 57 cents more per improved acre than on the grain farms. This consisted of an average additional return of 86 cents per improved acre for those farms of more than 800 acres in area, and only 29 cents more per improved acre for farms of 480 to 640 acres in size. In only two of the eight sets is the difference in returns greater than one dollar per improved acre. The farms in these two sets were the larger farms on medium productivity soils in both soil zones. These farms were also the only two sets of farms where the summerfallow wheat yields were higher on the grain-livestock farms than on the grain farms of comparable size.

Important factors in determining the income effects of the cattle enterprises are the price levels of wheat, cattle and wheat yields. Wheat was valued at the farm at \$1.57, \$1.75, \$1.65 and \$1.57 per bushel respectively for the four areas and years in Table 1. The Winnipeg price for good steers was \$24.40, \$20.85, \$23.20 and \$21.45 per hundredweight respectively. Since the study was done, wheat prices have

TABLE 1—INCOME COMPARISON OF GROUPS OF GRAIN AND GRAIN-CATTLE FARMS FOR TWO FARM SIZE GROUPS AND FOUR SOIL GROUPS

Year of Survey	Farm Group	Average Farm Size		Soil Zone	Soil Productivity Level	Average Cattle per farm	Number of Farms	Average Returns ^a
		improved	unimproved					
		acres				number		dollars per acre
1962 ^b	1a	556	112	Dark Brown	Low	5.6	18	2.51
	1b	557	165	Dark Brown	Low	37.9	15	2.56
	2a	1,031	160	Dark Brown	Low	4.9	13	3.48
	2b	951	341	Dark Brown	Low	46.8	18	3.51
1964 ^c	1a	598	29	Dark Brown	Medium	.8	20	5.46
	1b	581	112	Dark Brown	Medium	37.7	19	5.83
	2a	1,069	43	Dark Brown	Medium	1.0	20	5.66
	2b	1,049	150	Dark Brown	Medium	46.2	18	7.07
1963 ^d	1a	553	104	Brown	Low	4.4	19	9.42
	1b	594	622	Brown	Low	61.2	21	10.31
	2a	1,007	198	Brown	Low	3.9	19	10.72
	2b	1,060	562	Brown	Low	65.2	20	10.10
1961 ^e	1a	583	105	Brown	Medium	5.2	20	.68
	1b	589	178	Brown	Medium	36.0	20	.53
	2a	963	91	Brown	Medium	7.1	20	-1.10
	2b	1,016	269	Brown	Medium	49.0	20	1.31

^a Net return to capital investment and operator and family labor and management, in dollars per improved acre.

^b Ragush, M., *Changes in Farm Organization on Low Productivity Soils in the Dark Brown Soil Zone, 1962*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^c Ragush, M., *Changes in Farm Organization on Medium Productivity Soils in the Dark Brown Soil Zone, 1964*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^d Ragush, M., *Changes in Farm Organization on Low Productivity Soils in the Brown Soil Zone, 1963*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^e Ragush, M., *Changes in Farm Organization on Grain and Grain-Cattle Farms on Medium Productivity Soils in the Brown Soil Zone, 1961*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

TABLE 2—TYPE OF WINTER ROUGHAGE USED ON GROUPS OF GRAIN AND GRAIN-LIVESTOCK FARMS FOR TWO FARM SIZE GROUPS AND FOUR SOIL GROUPS

Year of Survey	Farm Group	Average Farm Size		Soil Zone	Soil Productivity Level	Farm-Produced		Grain Forage	Purchased Fodder
		improved	unimproved			Tame Perennial Grass Hay	Native Grass Hay		
		acres				tons per farm			
1962 ^a	1a	556	112	Dark Brown	Low	2.7	.2	4.8	.7
	1b	557	165	Dark Brown	Low	.6	31.0	5.5	6.9
	2a	1,031	160	Dark Brown	Low	5.8	6.3	2.0	.2
	2b	951	341	Dark Brown	Low	26.0	10.0	25.2	4.0
1964 ^b	1a	598	29	Dark Brown	Medium	—	.8	—	—
	1b	581	112	Dark Brown	Medium	16.0	7.4	5.9	.4
	2a	1,069	43	Dark Brown	Medium	1.1	—	—	—
	2b	1,049	150	Dark Brown	Medium	12.8	10.3	11.0	1.8
1963 ^c	1a	553	104	Brown	Low	.2	.7	4.1	—
	1b	594	622	Brown	Low	16.2	10.2	25.1	10.8
	2a	1,007	198	Brown	Low	1.3	1.1	16.1	.3
	2b	1,060	562	Brown	Low	19.5	13.2	34.2	4.5
1961 ^d	1a	583	105	Brown	Medium	—	4.2	3.5	—
	1b	589	178	Brown	Medium	2.3	11.1	18.8	1.7
	2a	963	91	Brown	Medium	.3	4.4	3.5	.8
	2b	1,016	269	Brown	Medium	4.6	25.5	28.7	2.7

^a Ragush, M., *Changes in Farm Organization on Low Productivity Soils in the Dark Brown Soil Zone, 1962*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^b Ragush, M., *Changes in Farm Organization on Medium Productivity Soils in the Dark Brown Soil Zone, 1964*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^c Ragush, M., *Changes in Farm Organization on Low Productivity Soils in the Brown Soil Zone, 1963*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

^d Ragush, M., *Changes in Farm Organization on Grain and Grain-Cattle Farms on Medium Productivity Soils in the Brown Soil Zone, 1961*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan.

decreased, and wheat marketings have been restricted; however, cattle prices have increased.

There are many complex supplementary and competitive aspects of adding a livestock enterprise to a grain farm in order to use the available unimproved grazing resources. Part of the improved land area used to produce the necessary winter feed could also be used to produce cash grain. The marginal cost of operating this land for cash cereal production is small, but the costs for the machines and haying equipment per ton of winter feed production will be high in those cases where roughage production is low. Also, some cost inputs such as operator's labor and certain costs of farm machinery are used for both cash cereal production and hay production. At times, these supplement one another thereby lowering the cost per acre of use. However, these farm enterprises may also be competitive, competing at crucial periods of the year for labor and machines. This may result in reduction in yield per acre of cereal crops.

Feed Sources

On farms in all groups, the unimproved native grass provided the summer pasture for cattle. The main

sources of winter feed were cereal grain hay, native grass hay, seeded perennial forage hay and cereal straw. Data on the use of straw were not obtained in these surveys. Of the other three sources of roughage, the average contribution to the winter feed supply on the smaller farms was 40 percent cereal grain hay, 38 percent from native grass hay and 22 percent from perennial hay. On the larger farms the proportions were 46 percent, 27 percent and 27 percent, respectively. (Table 2).

In a study (2) of cattle ranching in southern Alberta, the type of roughage fed is summarized "... in the shortgrass region, 50 percent is hay. The remainder of the roughage fed is oat sheaves and straw in a two to one ratio". The ratio between hay and cereal roughage used in this study is about the same as in the above study.

Cost Comparison of Different Roughage Sources

The cost of fodder production on a cash grain farm is:

- (1) The increase in the farm costs due to diverting some land used for cash grain production to fodder production.



(2) The reduction in income from grain sales. The increase in farm costs per ton of fodder produced depends on the amount of fodder produced. Cost data were calculated for the production of 112.5 tons of fodder. This is the approximate amount required to winter a 75 cow-calf enterprise. Data for the 1935-65 period from the Swift Current Research Station suggest an average annual yield of three quarters to eight tenths of a ton per acre can be expected from a mixture of grasses and legumes for a 12-year period.

Budgets were calculated for the production of this quantity of feed for the three different types of fodder, straw, cereal grain hay, and perennial grass-alfalfa hay, and two farm sizes: 1. a farm with 612 cultivated acres and, 2. a farm with 1060 cultivated acres.

In the calculation of the farm costs for these two farm units, data on machine inventory, land use and cultural practices from farm surveys (3) (4) were used. The added farm costs were only slightly less for the 1,060 acre farm, than for the smaller farm, and thus only the data from the 612 acre farm will be summarized.

Straw Cost

Wheat straw normally yields from .4 to .5 tons an acre and, on a cash grain farm, is left in the field. The increased farm costs for baling, hauling and stacking 112.5 tons of this crop residue were \$826 or \$7.34 a ton.

Oat Hay

The average yield of oat hay for 36 years during 1923 to 1966 at the Swift Current Research Station was 1.7 tons an acre (5). However, there is a loss in harvesting when the oats are cut with a swather. Therefore, with a harvested yield of 1.6 tons an acre, seventy acres will be required to produce 112.5 tons of fodder.

The costs for producing this hay were calculated on a marginal basis starting from the current cost structure on a grain farm. Seventy acres were diverted annually from cash cereal grain to annual oat hay. The field operations for the oat hay crop were the same as the cash cereal acreage until harvest. In the fall, the cereal forage crop was swathed, hauled to the farm, and stacked, instead of swathed and combined as grain. The reduction in combining costs was low since only the variable cost per acre was considered. Farm costs increased by \$829, or \$7.37 per ton, from a farm producing only wheat. In the case of cereal hay, there is also a reduction in the amount of grain that is available for sale. There

will be a loss of .625 acres of summerfallow crop for each ton of hay produced.

Perennial Grass-Alfalfa Hay

The field operations and management of the acreage diverted to perennial forage and harvested as hay are considerably different than those used in cereal grain production.

The forage stand must be established during one growing season and thereafter requires the various harvesting steps in each succeeding year.

To balance the amount of fallow and crop (two-year rotation) on the land not diverted to perennial forage hay production, it is necessary to seed half the perennial crop one year and the other half in the succeeding year. At the same time, it is not necessary to sacrifice a production year in establishing a forage stand. The procedure is as follows: In the first year, the perennial mixture is seeded in the late fall into undisturbed wheat stubble from which a grain crop has been harvested. At approximately the same time, the stubble land should be fall-sprayed to eliminate winter annual weeds. The seeded forage crop will become established and grow during the next growing season on stubble land which normally would have been summerfallowed. Although spraying, seed, and seeding in the fall do constitute an added farm cost in one year, there is a saving in the succeeding year in that no summerfallowing costs are required. Subsequently, the first hay crop will occur in the second year; that is, in the same year that grain would have been produced, had the conversion procedure not taken place. The haying procedure consists of mowing, raking, baling, hauling and stacking.

The perennial stand will not be continuous in that it will require plowing down after 10 to 15 years of production. One full growing season will be required to summerfallow the plowed-down sod after which the land can be seeded to grain to resume a two-year grain crop-fallow rotation. A production year is sacrificed at this time. Thus, 11 hay crops can be harvested in a period that would produce six summerfallow crops in a two-year summerfallow-grain rotation. Therefore, 12 hay crops are equivalent to 6.5 summerfallow crops. In the budgets, it was assumed that 12 hay crops yielding .75 tons per acre are harvested before the stand is broken.

It is expected that wheat grain yields following long-term perennial hay stands will be reduced for about two crop years. Experiments at Swift Current showed that the expected wheat yield reduction in the first crop is three bushels an acre, and two bushels an acre in the next wheat crop. Thereafter, the grain

yields on fallow will show normal production levels. All costs for the full period (establishment and productive period) were discounted to the seeding year and amortized over the full period. The interest rate used was eight percent. The production was also distributed over the full period in the same way, so that there was a difference in the harvested yield per acre and in the yield per acre for the forage rotation. The added farm costs were \$10.09 per ton of hay. There was also a reduction in grain available for sale of .726 acres of summerfallow crop for each ton of hay produced. In addition, there will be a reduction in grain yields after the forage stand has been broken and used again in a cereal crop-summer-fallow rotation. This reduction, discounted at eight percent was calculated to be .284 bushels of wheat for each ton of hay produced (Table 3).

TABLE 3—MARGINAL COST OF FODDER PRODUCTION ON A GRAIN FARM

	Yield Level	Increased Farm Costs	Reduced Wheat Available for Sale*
	tons per harvested acre	dollars per ton of fodder	bushels of wheat per ton of fodder
Wheat straw.....	.5	7.34	—
Oat hay.....	1.6	7.37	10.39
Grass-legume hay	.75	10.09	12.41

* Based on summerfallow wheat yield of 18 bushels per acre.

Straw is the cheapest fodder per ton for maintenance purposes of the three sources budgeted. With the relative yields of oat hay and grass-legume hay shown in Table 3, oat hay is the cheaper source of fodder.

Fodder Costs with Higher Grass-Legume Yield Levels

When grass and alfalfa are seeded in alternate rows with all rows spaced 18 inches apart, the average annual hay yields can be expected to average more than one ton per acre. In a current study going on since 1965 at the Swift Current Research Station, average annual yields of 1.3 tons per acre for grass-alfalfa have been grown. Recent studies also suggest that average yields of 21 bushels an acre can be expected from summerfallow wheat.

With hay yield of 1.25 tons an acre grass-alfalfa, only 90 acres are required to produce 112.5 tons per acre. The changes in farm costs and in wheat production are summarized in Table 4.

TABLE 4—MARGINAL COST OF FODDER PRODUCTION ON A GRAIN FARM

	Yield Level	Increased Farm Costs	Reduced Wheat Available for Sale*
	tons per harvested acre	dollars per ton of fodder	bushels of wheat per ton of fodder
Wheat straw.....	.5	7.34	—
Oat hay.....	1.6	7.37	12.25
Grass-legume hay	1.25	8.50	8.76

* Based on a summerfallow wheat yield of 21 bushels per acre.

Wheat straw is still the cheapest source of fodder per ton of the three sources budgeted. The grass-legume hay now becomes a cheaper source of feed than oat hay, except when wheat prices are less than 32 cents a bushel.

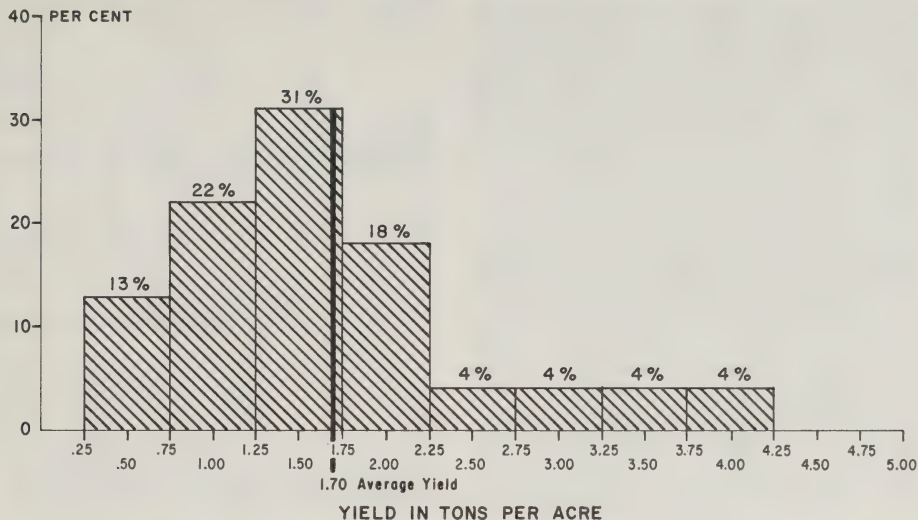
Other Factors

Annual Variation of Yield

The hay yields vary from year to year. For the 23 years for which oat hay yields are given (5), the average yield was 1.7 tons per acre. There were 13 years in which the yield was below 1.7 tons per acre and 8 years in which it was above 1.7 tons per acre (Figure 1). The most common yield was from 1.26 to 1.75 tons per acre. The coefficient of variation was 59 percent; that is, the yields varied greatly.

The average hay yield of a crested wheat grass-alfalfa mixture during the 1935-1965 period was .75 tons an acre. There were 20 years in which the yield was less than the average and nine years in which it was greater than the average yield. The most common yield was from .38 to .62 tons an acre (Figure 2). The coefficient of variation was 77 percent. A measure of variation in yield tells very little about the sequence of low and high yields. A succession of low yields or high yields are also critical. The crested wheat grass-alfalfa hay yields at the Swift Current Research Station in the period from 1946 to 1951 inclusive and from 1956 to 1964 inclusive were all below average at .37 and .39 tons per acre for these two periods, respectively. The average from the 1952-1955 period was 1.45 tons per acre. A series of high yields lead to a large carryover of hay and some loss from spoilage and deterioration of some of the hay. A series of low yields decreases the effective supply of fodder below the average annual yield, depletes feed reserves, lowers feed inputs per animal unit, decreases animal units fed, increases the amount of other crops needed for feed, and/or

DISTRIBUTION OF OAT HAY YIELDS, SWIFT CURRENT RESEARCH STATION 23 YEARS OF THE 1936-66 PERIOD ^{a/}

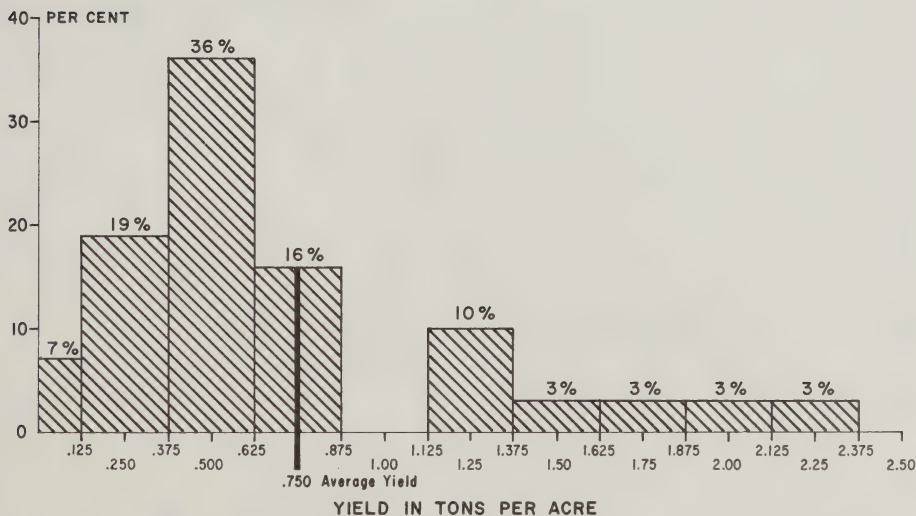


^{a/} Experiments on oat hay yields were carried out in only 23 years of the 31 year period, 1936 to 1966.

Source: Data used in constructing this figure were taken from Kilcher, M.R., "Precipitation and Perennial Forage" *Forage Notes*, Research Branch, Canada Department of Agriculture, Vol. 11, No. 2, Fall 1965.

FIGURE 1

DISTRIBUTION OF CRESTED WHEAT GRASS-ALFAFA HAY YIELDS, SWIFT CURRENT RESEARCH STATION, ALL YEARS 1935 to 1965



Source: Data used in constructing this figure were taken from Kilcher, M.R., "Precipitation and Perennial Forage" *Forage Notes*, Research Branch, Canada Department of Agriculture, Vol. 11, No. 2, Fall 1965.

FIGURE 2

increases feed purchases. The range of a sliding five-year annual average yield for the 1935 to 1965 period was .30 to 1.25 tons an acre for crested wheat grass-alfalfa hay. The data were not complete enough to calculate a similar range for the yield of oat hay; however, it was estimated that this range could be 1 to 2.2 tons per acre. The relative "cyclical" variation was greater for crested wheat grass-alfalfa hay than for oat hay.

Nutritional Value of Feeds

Cost per ton is not the only critical factor in evaluating feed requirements. The nutritional value must also be considered. The approximate nutritional value of these feeds is shown in Table 5.

Cereal straw is very low in protein and in energy per pound. Thus, it should be fortified with a protein supplement and a high energy feed. The cost of a pound of Total Digestible Nutrients (TDN) from cereal straw is .9 cents. In addition, there is the possible effect of a reduction in subsequent grain yield as a result of removing all of the (fibre and

TABLE 5—APPROXIMATE COMPOSITIONS AND DIGESTIBLE NUTRIENTS OF SELECTED FEEDS

Feedstuff	Dry Matter	Protein	Crude Fibre	TDN	Calcium	Phosphorous
		percent			grams per pound	
Hay						
Alfalfa, early bloom	90	14	28	51	6.7	1.0
late bloom	90	10	34	44	6.1	1.1
Bromegrass	89	8	26	49	1.9	.9
Oat.....	88	8	27	47	1.0	.9
Straw						
Barley.....	91	4	37	42	1.5	.4
Wheat.....	93	4	37	41	.7	.3

* Total digestible nutrients.

Source: *Feedlot Finishing of Cattle and Lambs*, Canada Department of Agriculture, Publication 1236, 1965, pp. 29.

organic matter) roughage growth. The oat hay is higher in protein content and energy value than cereal straw but lower than a grass-legume hay.

At high yield levels of wheat and grass-legume hay, the grass-legume hay is a cheaper source of feed



TABLE 6—MARGINAL COST OF FODDER PRODUCTION ON A GRAIN FARM

Units	Oat hay		Grass-legume hay	
Wheat yield . . . bushels per acre	18	21	18	21
Hay yield tons per acre	1.6	1.6	.75	1.25
Energy cost* . . . cents per pound of TDN	2.2	2.4	2.6	1.9

* Wheat valued at \$1.25 a bushel.

per pound of TDN than oat hay (Table 6) and the protein content is also higher.

CONCLUSIONS

The relative advantages and disadvantages of cereal hay and grass-alfalfa hay can be summarized as follows.

- (1) The increase in farm costs from a hay enterprise on a grain farm is less for oat hay production than for grass-alfalfa hay production. The additional farm costs of summerfallowing and seeding the acreage intended for hay production in the oat hay rotation are small because the tillage machinery is already owned.
- (2) Recent yields of grass-alfalfa hay per rotation are larger than oat hay yields. Thus the decrease in farm receipts from grain sales is less per ton for grass-alfalfa hay.
- (3) Recent yields at Swift Current indicate that grass-alfalfa hay is a cheaper source of feed than cereal hay. These yields were obtained with wide-spaced alternate rows. However, these results are only for the last five years.
- (4) The relative yield of grass-alfalfa hay and cereal hay will depend on local soil conditions.
- (5) A grass-alfalfa crop cut early yields the best quality roughage. At yields of 1.25 tons per acre, it is also less expensive per ton than

cereal hay yielding 1.6 tons per acre on fallow land.

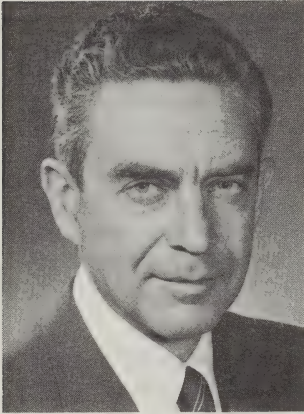
There are several other factors involved which are even more difficult to quantify. There is the difference in variability of yield from year to year. The greater the yield variability, the larger the storage cost and spoilage during storage. The use of oats as a source of cattle feed has more flexibility, because the amount of this crop harvested as hay can vary. Thus, a combination of the two sources of hay has advantages over a single source. In years of high grass-legume hay yields, some of the acreage intended for cereal hay can be harvested as grain; and in years of low perennial hay yields, some of the acreage intended for grain production can be harvested as hay.

NOTES AND REFERENCES

- (1) In each year of the survey, four sizes and types of farms were sampled and referred to as groups. These four groups consisted of farms with:
 - a) 480 to 640 acres of improved land and less than 10 head of cattle;
 - b) 480 to 640 acres of improved land and 10 or more head of cattle;
 - c) 800 to 1,400 acres of improved land and less than 10 head of cattle;
 - d) and 800 to 1,400 acres of improved land and 10 or more head of cattle.
- (2) Elgaard, Knud, *Cattle Ranching in Southern Alberta*, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan, Publication 68/3, February, 1968.
- (3) Ragush, M., *Changes in Farm Organization, Medium Productivity Soils, Brown Soil Zone, Saskatchewan, 1961*, Economics Division, Administration Branch, Canada Department of Agriculture, Saskatoon, Saskatchewan.
- (4) Ragush, M., *Changes in Farm Organization, Low Productivity Soils, Brown Soil Zone, Saskatchewan, 1963*, Economics Division, Administration Branch, Canada Department of Agriculture, Saskatoon, Saskatchewan, June, 1964.
- (5) M. R. Kilcher and D. H. Heinrichs, *Annual Crops for Forage in South-western Saskatchewan*, Research Station, Canada Department of Agriculture, Swift Current, Saskatchewan, 1968.

THE MUSHROOM INDUSTRY OF CANADA

J. R. Burns* and F. G. Curry**



J. R. Burns

INTRODUCTION

A walk through a supermarket might lead one to believe that mushroom growing brings easy and comparatively high returns. Indeed, judging by the number of inquiries received by this Branch in recent years, some growers have thought this to be true.

The opening pages of a Departmental booklet on the subject¹ warns the unwary with these words, "Mushroom culture calls for a mixture of art and scientific knowledge. The repeated production of successful crops requires years of experience...". The mushroom industry in Canada in 1970 had a farm value² of about \$10.5 million. Mushrooms are the third most valuable vegetable crop (following potatoes and tomatoes) in Canada and among the top five horticultural crops. In 1969, the total farm value of the Canadian mushroom crop represented 5 per cent of farm value of all vegetables produced in Canada and 3.6 per cent of all fruit and vegetables.

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**F. G. Curry was a student assistant during the summer of 1970.

¹ *How to Grow Mushrooms*—Canada Department of Agriculture, Publication Number 1205, 1965.

² "Farm value" is defined as the price received by the growers from sale of mushrooms.

"Mushrooms are the third most valuable vegetable crop in Canada... and production calls for a lot of labor..." "Canadians are eating nearly fifty per cent more mushrooms than five years ago..." "Since 1964, imports of mushroom have more than tripled... yet prices have remained relatively stable!"

Supply

Mushrooms are produced in all areas of Canada with Ontario being the largest producer, followed by Quebec and British Columbia. The Prairies and the Maritimes also grow mushrooms but on a much smaller scale than Ontario and Quebec. According to a Dominion Bureau of Statistics survey, there are about 107 growers who are producing mushrooms exclusively. Most market individually except in British Columbia where there is a marketing cooperative.

The production of mushrooms increased from 18.3 million pounds in 1964 to 22.6 million pounds in

TABLE 1—FRESH MUSHROOMS, SUPPLY AND DISPOSITION, CANADA, 1958-59 TO 1969-70

	Average 1958-59 to 1961-63	Average 1963-64 to 1967-68	1968-69	1969-70
	thousand pounds			
Supply				
Production.....	n.a.	19,475 ^a	23,096	22,634
Imports.....	789	1,823	2,170	2,241
Total supply.....	n.a.	21,298	25,266	24,875
Domestic Use				
Processed.....	7,023	9,812	16,080	13,580
Available for fresh use	n.a.	11,486	9,186	11,295
Net trade.....	-789	-1,823	-2,170	-2,241

n.a. = not available.
^a Four year average.

TABLE 2—CANNED MUSHROOMS SUPPLY, CANADA, 1958-59 TO 1969-70

	Average 1958-59 to 1961-63	Average 1963-64 to 1967-68	1968-69	1969-70
	thousand pounds			
Production.....	4,727	10,390	12,436	10,816
Imports.....	380	1,748	7,805	8,544
Total supply.....	5,107	12,138	20,241	19,360

1969, a 23.6 per cent increase (Figure 1). Total production in 1969 was down by two per cent from 1968 (Table 1). Canned production was 10.8 million pounds, slightly above the 1963-64 to 1967-68 average of 10.4 million pounds (Table 2). Imports of fresh mushrooms amounted to 2.2 million pounds in 1969-70, while imports of processed mushrooms totalled 19.3 million pounds. Imports of mushrooms, fresh and processed, in 1969 accounted for about a quarter of the total supply, in terms of weight³. During the five-year period 1963-64 to 1967-68, imports of fresh mushrooms were 8.5 per cent of the total fresh supply, and imports of processed mushrooms were 14.3 per cent of total processed supply. All of Canada's fresh mushroom imports originated in the United States—a total of 2.4 million pounds in 1969. Total imports of mushrooms grew rapidly from just less than three million pounds in 1964 to about 11 million pounds in 1969.

Since 1964, the total Canadian supply increased by approximately 12 million pounds. Of this increase, imports contributed 8.5 million pounds, and domestic production accounted for only approximately 3.6 million pounds. (Figure 2)

All domestic production was consumed in Canada. There were no exports of either fresh or processed mushrooms. The domestic supply was produced from a total area of 3.9 million square feet in 1969. Mushroom beds decreased from 4.1 million square feet in 1964 to 3.8 million in 1968. Although the total area of beds has decreased since 1964, the total area harvested has increased slightly. This results from the practice of taking more than two crops off the beds each year.

Increased yields have also increased productivity and efficiency in the industry. Since 1964, the average yield of mushrooms in Canada rose from 1.8 pounds per square foot to a high of 2.5 pounds per square foot in 1967 and fell to 2.2 pounds per square foot in 1969. Eastern Canada has consistently obtained

TABLE 3—AVERAGE YIELDS OF MUSHROOMS, CANADA BY REGIONS, 1965 TO 1969

Year	Canada	Eastern Canada	Prairies	British Columbia
	pounds per square foot			
1965.....	2.0	2.2	1.7	1.3
1966.....	2.1	2.3	2.3	1.3
1967.....	2.51	2.5	3.5	2.3
1968.....	2.4	2.5	2.0	1.9
1969.....	2.2	2.5	1.5	1.5
Average 1965-69.....	2.24	2.40	2.20	1.66

yields between 2.2 and 2.5 pounds per square foot, but in British Columbia and the Prairies, yields fluctuated from 1.2 to 2.3 pounds per square foot during the period. This would indicate a higher degree of technology in mushroom-growing in Eastern Canada, where the largest commercial operations are located. The Canadian average yield for the period was 2.24 pounds per square foot. (Table 3).

Prices

The average prices received by growers have changed little during the 1965 to 1969 period (Figure 1). Prices ranged from a low of 41.6 cents a pound in 1966 to a high of 46 cents a pound in 1969. A probable reason for the price stability is that a larger portion of the total Canadian supply is imported. Tariff rates are 4.5 cents per pound for fresh mushrooms and 12.5 per cent for processed mushrooms. In the United States, the average price to growers in the crop year 1969-70 was 37.5 cents a pound; mushrooms sold to processors averaged 33.9 cents a pound and fresh market sales averaged 45.1 cents a pound.

Over the five years 1965-69, wholesale to retail prices for fresh mushrooms have been rising in four main markets—Montreal, Toronto, Winnipeg and Vancouver. For the first 11 months of 1970 prices were the same or higher than in the previous year.

The proportion of the crop being sold on the fresh market since 1966, as well as the actual quantity, is gradually increasing. There were differences in the prices received from sales on the fresh market and sales to the processors. (Figure 1). Fresh market prices rose 17.5 per cent between 1965 and 1969 while the prices received from the processor rose only 10.3 per cent. Moreover, the per pound price of crops processed by growers dropped marginally during the same period (Figure 1).

³ Fresh market weight plus the net weight of canned mushrooms.

PRICES, VALUES AND PRODUCTION OF MUSHROOMS, CANADA, 1965 TO 1969

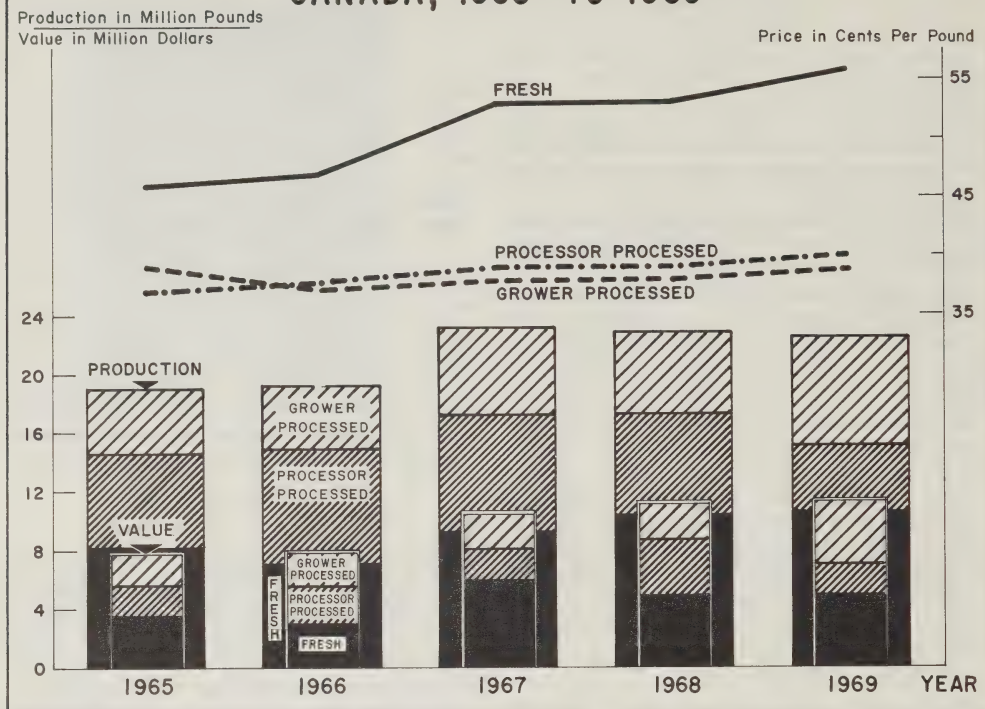


FIGURE 1

Processing

The amount of the Canadian mushroom crop processed increased from an average of 9.8 million pounds during the 1964-65 to 1967-68 to 13.5 million pounds in 1969-70. The percentage of the domestic crop that went into processing averaged 41 per cent during the 1963-67 period and rose to a high of 69 per cent in 1968-69. From 1968 to 1969 the quantity processed was down by 2.4 million pounds and the quantity processed by growers was up by 1.8 million pounds. Most of the latter increase occurred in Ontario and Quebec, where the large producers have their own processing facilities. During 1969, for the first time, more mushrooms were processed by growers than by canners.

In 1969-70, imports of processed mushrooms had risen to 44 per cent of the total processed supply. Nine million pounds of processed mushrooms were imported into Canada in the calendar year of 1969,

of which 6.5 million pounds originated in Taiwan, Canada's largest supplier. The second largest supplier was the Peoples' Republic of China, at 2 million pounds. Several other countries contributed much smaller amounts.

Consumption

During the 1964-69 period there was a large increase in per capita mushroom consumption from 1.1 pounds in 1964 to 1.6 pounds in 1969 (Figure 2). This increase consumption is closely related to Canadian increased standard of living. Mushrooms were once considered a luxury food, but in recent years, their consumption has increased so much they can no longer be considered in this category. The increase in both consumption and population has expanded the Canadian market by more than 50 per cent since 1964.

PRODUCTION, IMPORTS AND CONSUMPTION OF MUSHROOMS*, CANADA, 1964 TO 1969

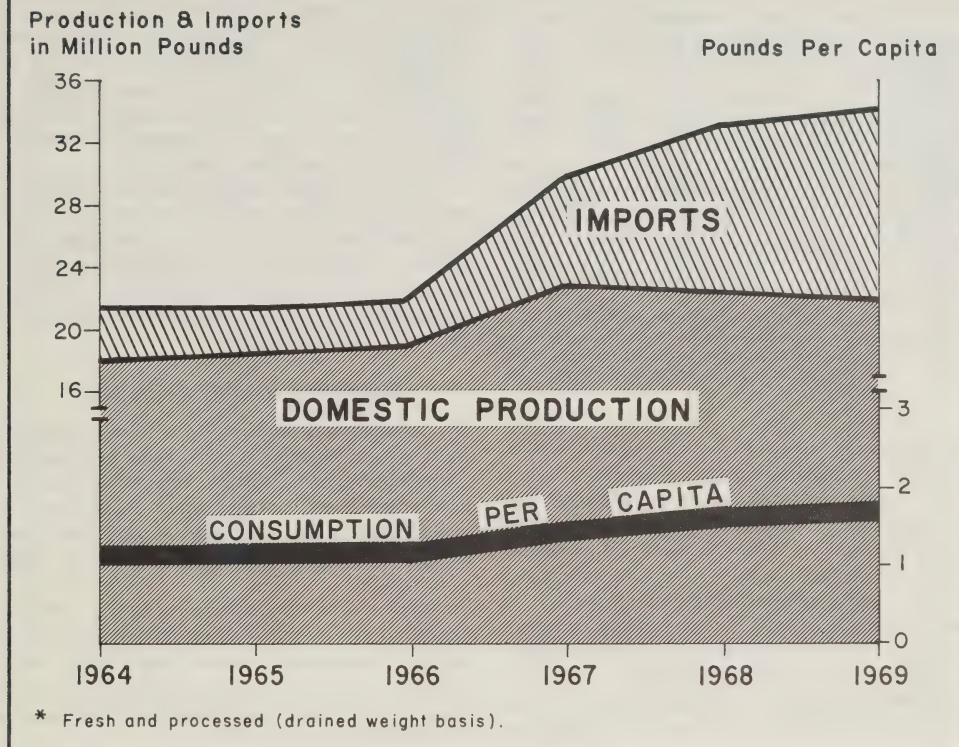


FIGURE 2

Industry Problems

The problems of mushroom production are those of a specialized enterprise. They include a high susceptibility to insidious diseases and pests, high capital costs, high perishability, and sharp competition from low priced imports.

Diseases and pests are more hazardous to mushroom cultivation than those of other crops. Quick and elaborate measures must be taken to ensure the destruction of competitive micro-organisms which spread rapidly and the damage to the crop is complete. Pasturization of the growing medium is required to destroy the pests and diseases. Sterilization of the casing soil is required. In addition, a thorough sanitation program for both houses and workers is a strict necessity.

Special buildings in which sanitation, temperature, humidity and ventilation are controlled are necessary. This means high capital expenditures. Specialized equipment such as compost-pile turners and abundant water supplies for steam pasturization are needed. The Dominion Bureau of Statistics annual survey⁴ published data concerning the value of investment in mushroom enterprises as in Table 4. Mushrooms bruise easily and do not keep well without refrigeration. Freshly harvested mushrooms will keep in prime condition up to 5 days when held at 32°F. But at 50°F they are good for only one day. The big problem is what to do if market supplies exceed demand. Canning or other-

⁴ Catalogue No. 22-003 F.V.R. No. 2, Canadian Mushroom Growers Survey, 1969.

TABLE 4—INVESTMENT IN MUSHROOM GROWERS' FACILITIES, CANADA, 1969

	Number Report- ing	Canada	Eastern Canada	Prairie Prov- inces	British Colum- bia
			\$'000		
Land.....	87	5,364	4,473	60	831
Building for Packing and Processing..	85	5,839	4,616	602	621
Other Buildings....	50	784	643	69	72
Heating Equipment..	83	617	416	111	90
Cooling Equipment..	69	573	496	42	35
Processing/ Packing Equipment..	24	207	186	18	3
Other Machinery..	84	1,733	1,305	240	188
Total Invest- ment.....		15,117	12,135	1,142	1,840

Source: Canadian Mushroom Growers Survey 1969,
Dominion Bureau of Statistics Catalogue No.
22-003.

wise processing seems to be an obvious answer. But there are difficulties here too. Surplus production does not always correspond to the available processing facilities, nor is the grower in a good bargaining position *vis à vis* the processor. A partial answer for growers has been to invest in processing facilities. But whether the grower processes his own production or sells it to a canning company, the end product must compete with large quantities of good quality, low priced imports.

Mushroom production is characterized by a high labour input. Such labor in Canada is specialized

and comparatively costly. In Taiwan, the cost of this labour is low.

Taiwan has become a leading world exporter of canned mushrooms in recent years. In 1960, Canada imported 720 pounds of mushrooms from Taiwan, but by 1968 imports increased to a peak of seven million pounds. In 1969, imports from Taiwan were 6.5 million pounds. In 1960, Taiwan imports accounted for only .2 per cent of canned mushroom imports and by 1969, they accounted for 72.2 per cent of canned imports—a tremendous expansion for a period of less than 10 years.

In the past two years imports from the Peoples' Republic of China have increased rapidly. It may also be noted from Table 5 that the mainland China freight on board prices of mushrooms are fifteen per cent lower than those from Taiwan, even though mushrooms from Taiwan have dropped in price by fifteen per cent⁵ since 1965.

SUMMARY AND CONCLUSIONS

The production of mushrooms has been expanding steadily since 1964, but is not keeping pace with the expanding Canadian market. Imports of processed mushrooms have increased much faster than Canadian production and have kept prices down, thus contributing to a greatly increased per capita consumption.

Profitable mushroom growing requires an alternate market to fresh sales. The production of a highly perishable commodity requires the ability to dispose

⁵ One pound of canned mushrooms equals one and a third pounds of fresh mushrooms according to the Canadian Mushroom Growers Association.

TABLE 5—CANNED MUSHROOMS, IMPORTS, TOTAL VALUE AND AVERAGE PRICE PER POUND, 1964 TO OCTOBER, 1970

	Taiwan			Other Principal Countries U.S.A., Japan, P. Rep. of China			All Countries	
	Gross Wt.	Value	Price per Pound Gross	Gross Wt.	Value	Price per Pound Gross	Gross Wt.	Price per Pound Gross
	lb.	\$000	¢	lb.	\$000	¢	lb.	¢
					U.S.A.			
1964.....	1,513,626	492	32.5	30,685	13.8	45.0	1,587,367	33.4
1965.....	1,444,606	583	40.4	51,313	35.4	69.0	1,557,977	41.5
1966.....	1,436,834	569	39.6	117,150	71	60.6	1,633,468	41.3
					Japan			
1967.....	3,192,001	1,254	39.3	229,032	95	41.5	3,608,066	40.4
					Peoples' Republic of China			
1968.....	7,120,914	2,475	34.8	288,227	99	34.3	7,701,967	35.3
1969.....	6,520,204	2,250	34.5	2,252,640	744	33.0	9,035,199	34.3
To Sept. 1970..	5,647,377	1,930	34.2	1,180,380	343	29.1	6,960,077	33.6
To Oct. 1970..	6,078,002	2,071	34.1	1,435,380	418	29.1	7,678,386	33.5

Source: Trade of Canada.

of large surpluses often, to supplement fresh market sales. Temporary storage is only a partial answer since high quality low priced fresh mushrooms may be readily imported from the United States. Canning or otherwise processing mushrooms has been the standard answer. It has been the custom for most growers to sell surplus mushrooms to canners, but in recent years canners have been buying decreasing amounts. Thus, growers must either sell more on the fresh market, or can increasing amounts with their own facilities. The latter course has been taken increasingly and as a result growers are being forced into a highly specialized operation.

Since mushroom growing requires a high labour input it is likely that canned imports will continue to increase, especially from Taiwan and China. This will tend to reduce the demand for Canadian processed mushrooms and reduce the growth possi-

bilities of the industry. Although production has increased significantly since 1964 the number of square feet devoted to production has remained remarkably stable. Nevertheless, the Canadian market for fresh mushrooms should continue to grow, because of the increasing population, a growing interest in 'gourmet' cooking and because consumer demand is greater than domestic production.

According to an industry spokesman mushroom growers will be able to supply future increases in demand. They can quickly expand present capacity, are ready to increase mechanization and the already high level of scientific technology. If the industry can compete with downward trend in the prices of imported mushrooms, the industry will thrive. If the growers cannot compete with foreign producers, we will then be eating fresh American mushrooms, or canned Asian mushrooms, with our steak.

POLICY AND PROGRAM DEVELOPMENTS

A Charge to CANFARM Users

The Minister of Agriculture is authorized to charge CANFARM user agencies, as of January 1, 1971, an annual fee of \$15 per farm registered on or after January 1, 1971. Exceptions are registered research farms, test farms, and other farms as may be designated for exclusion by the Minister on the recommendation of the National Farm Management Committee.

Premiums

Lamb Carcass and Hog Carcass Premium Regulations were revoked, January 1, 1971.

Ontario Bean Producers' Marketing Board Final Payments

The final payment to bean producers who participated in the Ontario Bean Producers' Marketing Board co-operative marketing plan has been approved by the federal government. The payments are 43 cents a hundredweight for pea beans and \$6.70 a hundredweight for yellow-eye beans produced in Ontario in 1969. (November 10, 1970)

Prince Edward Island Crop Insurance

Two levels of insurance are available for potatoes an 80 percent level of coverage, and now an optional 60 percent coverage level, with a correspondingly lower premium rate. (November 17, 1970)

Sugar Beet Deficiency Payment

Sugar beet growers will receive a deficiency payment of \$2.29 a standard ton of beets for the 1969 crop. The 1969 support level was \$15.98 a standard ton. (A standard ton of sugar beets is the amount of beets required to produce 250 pounds of sugar.) Producers have already received an interim deficiency payment of \$1.50 a ton. The support level for the 1960 crop is also \$15.98 a standard ton. (December 7, 1970)

WHAT IS HAPPENING ABROAD IN POLICIES AND DEVELOPMENTS

"SPOT NEWS FROM ABROAD" A snappy little newsletter provides a quick review of current developments in many countries.

With the permission of the authors we are lifting the following information from Issue No. 2, January 8, 1971. This newsletter is issued by the International

Liaison Service, Canada Department of Agriculture, Sir John Carling Building, Ottawa, in co-operation with the Trade Commissioner Service, Department of Industry, Trade and Commerce. Readers may find the following notes useful:—

Grains

There are new guaranteed wheat prices in AUSTRALIA. Changes in the guaranteed price and in the home consumption price were announced recently by the Minister for Primary Industry. The increase in the home consumption price is less than one cent and the Minister could see no reason why there should be an increase in the price of flour or bread to consumers. The guaranteed price for fair average quality (F.A.Q.) wheat of the 1970-71 Pool would be 147.5 cents a bushel bulk basis, free on board vessel, at ports of export. It is effective on 200 million bushels of export from the Pool. (A\$1 = Can.\$1.13)

This new price was 1.6 cents up from the 1969-70 level and thus 2.5 cents above the level set for 1968-69 when the fifth Wheat Industry Stabilization Plan came into effect. Annual price adjustments under this Plan covered changes in cash costs, rail freights and handling and storage charges for wheat. [Canadian Commercial Secretary, Melbourne]

Stockfeed prices for wheat in Australia are changing. New prices for wheat used for stockfeed and for industrial purposes have been announced by the Wheat Board following the application of the new guaranteed price and a new home consumption price for wheat.

Wheat for stockfeed will have a basic price of \$1.55 a bushel. However, any purchaser who undertakes to buy the whole of his wheat requirements for stockfeed purposes from the Board for the year ending 30 November 1970 will be able to buy supplies at \$1.45 a bushel. This lower price will also apply to wheat sold for feeding starving stock in declared drought areas and for the bran and pollard components of milled wheat. Wheat for the manufacture of flour for industrial use will be priced at \$1.45 a bushel. [Canadian Commercial Secretary]

Livestock

Package deal for pig farmers in BRITAIN. A complete, package deal, pig breeding unit is being offered by a British company which includes the supply and erection of all housing, automatic feeding equipment, supplying pigs and a program of management training for operators.

Dairy Products

Consumers are Getting Cheap Butter in FRANCE. After long negotiations the French marketing organization FORMA (Fonds d'orientation et de régularisation des marchés agricoles) has reached agreement with private stockists on a special cheap offer of 5,000 tons from their stores at the end of December. The sales are officially described as a promotion offer. The stockists will receive Fr. 0.80 per half pound pack as the difference between their selling price to wholesalers and the present intervention price of Fr 9.40 per kg. The maximum retail price is fixed at Fr. 2.80 per half pound pack. The trade does not expect this cheap offer to have much effect on retail prices for many supermarkets are already selling butter at Fr. 2.90 [Agra Europe, London, 16 December 1970]

Special Crops

The production of winter **rapeseed** in DENMARK during 1968-69 totaled 14,632 metric tons; exports reached 4318 metric tons. Production in 1969-70 had dropped to 9,091 metric tons and unofficial estimates place it at only 2,990 metric tons for 1970-71. The production of spring rapeseed in 1968-69 totaled 15,224 metric tons. Imports are limited to 129 metric tons and exports amounted to 5,152 metric tons. Production in 1969-70 dropped to 12,042 metric tons, and unofficial estimates place it at 17,750 metric tons for 1970-71.

The production of yellow **mustard** in 1968-69 totaled 15,486 metric tons. Imports amounted to 11,478 metric tons. Production in 1969-70 dropped to 10,860 metric tons, and unofficial estimates place it at 6,620 metric tons for 1970-71. The production of brown mustard in 1968-69 totaled 472 metric tons. Production climbed to 607 metric tons in 1969-70 and unofficial estimates place it at 700 metric tons for 1970-71.

The production of **flaxseed** in 1968-69 was 31 metric tons. Imports totaled 4,931 metric tons and exports 2 metric tons. Production in 1969-70 climbed to 165 metric tons, and unofficial sources state that production in 1970-71 is too insignificant to be considered. Canadian exports of flaxseed to Denmark in 1969 totaled 33,036 metric tons at Cdn.\$218,436. Imports into Denmark of flaxseed during the first ten months of 1970 totaled 3,797 metric tons at Cdn.\$527,000; Canadian exports, according to official statistics, accounted for 2,685 metric tons at Cdn.\$363,000.

Denmark is a large importer of soybeans, and imports during the first ten months of 1970 totaled 437,879 metric tons valued at Cdn.\$50.6 million, practically all of it from the U.S.A. [Canadian Commercial Assistant, Copenhagen]

The most important fact in the **U.S. soybean situation** is that for two years the amounts used and exported have exceeded production—with the result that practically all reserves will be used up by the end of this marketing year (September 1). In 1971, farmers will have to plant about 50 million acres in soybeans, to maintain the present levels of use and exports. This would be an 18 percent increase over the 1970 acreage.

According to USDA economists, the supply of soybeans available for the past marketing year totaled about 1,360 million bushels—down from the 1,441 million figure of a year before. Total disappearance during 1970-71 may be about 1,300 million bushels. If these figures prove to be correct, the carry-over next September 1 will be only about 60 million bushels. Some 324 million bushels were carried over in 1969, and 229 million last fall.

During the 1969-70 marketing year, soybean processors used 738 million bushels of soybeans—22 percent more than the year before. Soybean exports totaled 429 million bushels—a 50 percent increase over 1968-69. Exports are expected to equal or exceed that amount in 1970-71, as processing capacity in many countries has been increased. [Illinois Farmers' Outlook Letter, Urbana, 16 December 1970]

After the rather disappointing **world** output in 1969, production of **rapeseed** in 1970 showed a marked improvement. Canada harvested a crop over twice as big as that in 1969, at 1.6 million tons, following a 96 percent increase in acreage, and production in Common Market countries and East Europe was generally better.

With prospects for a good supply of rape oil from the 1970 seed crops it was just a question of price in relation to competing oils before trade could begin. However, the market for rape oil in European countries was disrupted by reports in August that the erucic acid in rape oil used in edible products could prove harmful. This resulted in a number of large users of rape oil in Western Europe cutting down their intake, thus reducing sales prospects

for the oil. [The Public Ledger, London, 26 December 1970]

The Impact of the "Green Revolution" and Nutrition

The success of the "green revolution" is growing. New rice, wheat and corn strains based on the "miracle" seeds developed in Mexico and the Philippines are giving higher yields. But only a small proportion of the rural population has as yet benefited from these discoveries. No such break-through has been achieved for other grains or other food crops and little improvement has yet been achieved in the productivity of the wheat and rice grown in the vast acreage lacking controlled water supplies. Until such deficiencies can be eradicated, the "green revolution", by giving benefit of improved yields especially to the rich classes, may lead to increased inequality in rural areas and to unfortunate social and political consequences.

Steps have been taken in various countries to counteract food deficiencies. The Indian Government, for instance, has decided to devote more resources to child nutrition under its latest five-year plan, and in the big towns wheat bread is being fortified with synthetic lysine, vitamins and iron. Tests are also being made on tasteless fortification of salt and tea, which are extensively consumed, even in rural areas and by small children.

Higher incomes may have some adverse effects on nutrition. In some parts of India, they result in a worsening of diets, with sorghum and raw sugar giving place to polished rice and refined sugar of lower nutritive value [Official Review of Development Problems by the Chairman of the Development Assistance Committee of the OECD, Press Release, 10 December 1970]

The EEC and Development Assistance

The OECD Development Assistance Committee met on December 1 to review the development assistance efforts and policies of the EEC. The DAC noted the higher volume of community assistance; it rose to \$180 million in 1969 from \$149 million in 1968. One of the major forms of assistance consisted of grants for food aid in cereals—\$20 million—to which is to be added a program for the delivery of dairy products. [OECD Press Release, 3 December 1970]

IDA's Agricultural Loan to Indonesia

The International Development Association has granted a loan of \$14.5 million to Indonesia for the financing of an agricultural credit program that includes the re-opening and modernization of three major irrigation systems. This project will give rise to a marked increase in rice production and to better living conditions for 200,000 farm families.

PUBLICATIONS

CANADA DEPARTMENT OF AGRICULTURE PUBLICATIONS

■ **Farming in Canada**—Revised, 1970. 57 p. illus., maps. Paper cover. Publication No. 1296.

This publication outlines the physical and social conditions of farming in Canada from coast to coast. Types of production, marketing and how farm products reach the consumer are explained in a general way. Steps taken by the federal government to assist farmers and safeguard the nation's food supply are also explained. Available free of charge from the Information Division, Canada Department of Agriculture, Sir John Carling Building, Ottawa.

■ **Soil capability for Agriculture. Canada Land Inventory (ARDA), Ottawa.** This bilingual publication provides a detailed, large-scale map with a text. It is available for the various regions of Canada for 35 cents. Department of Regional Economic Expansion.

■ **Farm Letter,** This bi-monthly, bilingual leaflet provides information for farmers and others interested in agriculture on a wide variety of developments taking place in the Canada Department of Agriculture. Free. Available from the Information Division, Canada Department of Agriculture, Sir John Carling Building, Ottawa.

■ **Dairy Produce Market Report.** Provides weekly dairy market information; bilingual. Free. From the Information Division, Canada Department of Agriculture, Sir John Carling Building, Ottawa.

OTHER PUBLICATIONS

■ **National Grain Policies.** This 244 page, paper-covered publication presents a detailed analysis of policy objectives, price supports and other measures affecting agricultural production, as well as measures affecting foreign trade which have occurred in fifty-one countries since 1959. Price... unstated. Prepared by the Grains Section, Food and Agriculture Organization of the United Nations (FAO), Rome, 1969. Available from Information Canada, Ottawa.

■ **Income Security for Canadians,** This 60 page, blue, paper-covered publication discusses the Canadian government's assessment of the income security issue in Canada. Unemployment Insurance, Old Age Pensions and Family Allowances are discussed. Published by the Department of National Health and Welfare.

There are many useful publications available from Information Canada, Ottawa. Most of these publications are for sale.

Many DBS publications, are also in demand... some for a fee... some free. The address is Publications Distribution Unit, Dominion Bureau of Statistics, Ottawa, 3, Ontario. State the title, catalogue number and the issue requested. It is also necessary to send a cheque or money order payable to *Receiver General of Canada*. And...if you don't have lists of what is available, talk to a librarian, or write Information Canada, Ottawa.

■ **OCED Agricultural Review,** (Formerly Fatis Review)

A magazine featuring on agricultural policies and structures of the world; higher education; environment pollution; research; production, marketing and new publications in Issue No. 3, 1970, Volume 17. The OECD* Committee for agriculture reports through this publication on OECD programmes and activities and provides a forum for the exchange of new ideas and experiences on world agricultural development. It is published four times a year in English and French, by the Directorate of Agriculture and Food (Division for Technical Action) by the Organization for Economic Cooperation and Development, 2 rue Andre—Pascal, Paris—16^e, France. "A must in reading, in my opinion, for those who want a greater world perspective on agriculture"—managing editor of Canadian Farm Economics.

*OECD means Organization for Economic Cooperation and Development.

■ **1970 Handbook of Agricultural Charts.** This book, (No. 397) 144 pages, is available from the U.S. Department of Agriculture, Economics and Research. It is for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402—Price \$65.

■ **Report of the Second World Congress 1970.** The Hague, June 16-30, 1970. Volume 1.

The price of this FAO publication is not stated however it may be ordered from Information Canada, Ottawa.

■ The Canadian Hunger Foundation, as the Canadian Non-Governmental Arm of the United Nations Food and Agricultural Organization, maintains a library service providing authoritative and up-to-date publications on world food problems. The annual \$10 subscription offers a package of several useful publications: "Ceres"—a bi-monthly illustrated

journal of FAO activities; "World Food Program News"—bi-monthly report by FAO on how food is being used for development in the developing nations; and "Hunger"—the quarterly publication of the Canadian Hunger Foundation relating the work of FAO and other agencies to the Canadian scene.

The Canadian Hunger Foundation collects and distributes useful publications from sources which are provided, all, within the subscription price—examples include the report of the "Canadian International Development Agency" and "The World Bank Atlas".

Posters, suitable for display and teaching purposes are also available.

Reference Sources. Correspondence is invited from teachers and librarians requiring special sources of information.

The address for all of the above is the:

CANADIAN HUNGER FOUNDATION,
75 SPARKS STREET,
OTTAWA 4, ONTARIO, CANADA.

■ **Innovation in Higher Education—Reforms in Yugoslavia**, Prepared by OECD—1970.

This publication is one of a series of case studies on innovation in higher education. It expresses the Views of the Institute of Social Research, University of Zegreb, Yugoslavia.

"It is now recognized that educational systems, in general, and higher education in particular, cannot respond to the needs of society unless there are more profound adaptations."

The term innovation as it is used here, and as distinct from change, implies purposeful orientation. Sold by Information Canada, Ottawa.

■ **Occupational and Education Structures of the Labour Force and Levels of Economic Development.** Issued by OECD Paris 1970. This publication deals with the economic and manpower aspects of education... economic growth and economic expansion.

■ **The Management of Agricultural Research.** Issued by OECD Paris 1970...a report of the first international working conference (assembled under the offices of OECD, the Directors and Administrators of Agricultural Research with members of the organization and various other countries which was) held at Paris from 24-28 November, 1969.

This report is on one of three fundamental supports for agriculture... ..RESEARCH, EDUCATION and EXTENSION; 174 pages; sold by Information Canada, Ottawa.

■ **Human Resources, Education and Economic Development in Peru.** By OECD, Paris, 1967, 375 pages; sold by Information Canada, Ottawa.

This report takes the economic and social development targets of Peru as a basis for long-term forecasts for human resources...and follows with the corresponding educational requirements which would serve as a foundation for planned educational development.

■ **The State of Food and Agriculture 1970.** Published by FAO. "A most informative 275 page publication; provides a world view of agriculture and a review by regions." It discusses agriculture at the threshold of the second development decade.

A. H. Boerma, Director General, FAO, states in the foreword "the year 1970 is in several respects a special one for FAO. It is the 25th anniversary of the organization...plus a year that calls for an assessment of past performance and of the task of the future... how to achieve a desirable level and pattern of food crop production is the first of the major problems of the second development decade. It is not only necessary to insure that the momentum of the spread of high yielding cereals is maintained in the countries where they have already been introduced but also that the higher level of technology, that the new varieties represent, is extended to other crops and to other countries...Also necessary, is to insure that a number of important side effects caused by the technological changes in such fields as trade, employment and income distribution are successfully dealt with.

The report sets out and discusses four major problems...Food Crop Production...Livestock Production...Agricultural Export Earnings and Rural Employment.

The crucial role of agriculture in economic and social development; the increased government investment in the agricultural sector in several of the latest development plans; the increased assistance for agriculture in spite of the unfortunate slowdown in foreign aid; and the recent achievements of farmers in many countries...all show grounds for hope for mankind.

The author sees the energies and the enthusiasms of youth as a powerful force for development. Sold by Information Canada, Ottawa.

CORRECTIONS

Volume 5, Number 5, December 1970

Page 22, Table 3.

Each figure in the bottom two rows should be placed one column to the left.

Page 26, Note (2), line 28.

1969 should read 1960

A consolidated index of Volume 5 will appear in Volume 6, Number 1, April, 1971.

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HON. H. A. OLSON, MINISTER — S. B. WILLIAMS, DEPUTY MINISTER

Canadian Farm Economics is published bi-monthly by the Economics Branch, Canada Department of Agriculture, Sir John Carling Building, Ottawa, and is based on material prepared by economists of the Economics Branch.

Its purpose is to provide farmers, research and extension workers, government administrators and agri-business organizations with information on current economic developments in Canadian agriculture. Articles or other material appearing herein may be reproduced without permission provided credit is given to the author(s) and to the Department.

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CANADIAN FARM ECONOMICS

AGRICULTURAL POLICY

A Review of Current Canadian Agricultural Policy and Programs

An outline of the general philosophy of the Government of Canada on agricultural policy.

"Canadian agriculture should be self-supporting and market orientated . . . within the current generation."

"Our short term interests and actions must be reconciled with our long term philosophy and objectives."

"Fair competition in trade is vital . . ."

" . . . [A]griculture should provide a return . . . equivalent to that obtained by other sectors of the economy."



G. A. Hiscocks

OBJECTIVES

Canadian agriculture should be self-supporting and market orientated:

We live in a world which evolves extremely rapidly, and there can be no economic, nor social progress, without the willingness to accept and promote changes. Competition generates changes. Progressing is changing. During the past decades, we have become a highly industrialized and urbanized country; in many respects, our traditional society has been transformed into what has sometimes been called an affluent society.

We have not, by any means, reached perfection. Canadians have one of the highest standards of living in the world and our voice is heard in the

community of nations; however, our society and our economy have many shortcomings. The very fact we have problems to overcome, together with the necessity to maintain and further develop the already positive aspects of our society make it important for us to remain receptive to change and meet the challenge which confronts us. This applies directly to Canadian agriculture.

It would be an error to underestimate the changes and progress Canadian agriculture has already undergone, and the difficulties it has gone through. They have been very sizeable. In spite of them, and to overcome them, many parts of Canadian agriculture have been highly organized. Productivity has increased and technical progress has increased so that combined with our natural comparative advantages, producers of some commodities are among the most efficient in the world.

Although Canadian agriculture has always had obstacles to overcome, it has for a long time operated in a much more stable environment than the

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current circumstances. During the second half of the sixties, the position of many sectors of Canadian agriculture has become more and more difficult. The old problems have remained, and have become more acute; the gap between farm incomes and non-farm incomes is as wide as ever, while the needs and aspirations of the farmers are the same as the needs and aspirations of the other Canadian citizens, and are increasing at the same pace.

New problems have arisen; long overdue and considerable technological progress has taken place in the agriculture of other countries. Substitutes have been created which compete with farm products. Some international developments have occurred to reduce our traditional markets. Our agriculture still has a great potential. We can still defend the position that comparative advantage gives us. But we must realize that we are more seriously challenged than ever before. The impact of new supply sources and new products on our markets, abroad and in Canada, is not of a temporary nature. It is a fundamental transformation in the structure of our environment. We cannot afford to ignore it.

The deep changes which are taking place in our environment must not be hidden from ourselves. On the contrary, Canadian agriculture must be aware of them at every level of decision making. It must feel the pace at which they proceed and the competition which brings them about. To this end, the market is an irreplaceable guide, and although at times its impact may be unpleasant, we must be ready to receive it and react to it. It must not be forgotten that the consumption of most food products is inelastic and does not increase as incomes rise so that potential sales are limited. The structure of Canadian agriculture, its production processes, its approach to market development, in other words, its pattern of behaviour, must be geared to meet the environmental change which the market transmits to us; Canadian agriculture must be market conscious and market orientated. If it were not, it would fail to meet the challenge of competition and change, and it would lose the chances it has to curb the unfavourable trends which confront it.

Our efforts to conceive, plan and implement programs and policies adapted to the realities of the seventies aim to reconcile the trends which diverge to the point of not being consistent with the necessities of efficiency and competition and the individual aspirations of farmers. But it must be assumed that efforts to relieve farmers from the brunt of the market, do not, in fact, result in more people being brought into the low income sector.

Sustaining production through monetary transfers to agriculture is valid under conditions when farmers face unwarranted price fluctuations. When fundamental modifications are occurring in the structure of the market, transfer payments are necessary to provide transitional assistance as farmers take steps to adjust to the new market situations. But, it would be sheer mismanagement if it resulted in keeping on the farm, at the expense of the taxpayer or of the consumer, human beings who would not have any real chance to self-fulfillment and affluence, and manpower resources which could be more productively employed in other industries.

When maintained for too long, subsidized prices bias the orientation of the economy, without significantly improving the fate and prospects of the farmer. In the interest of agriculture, as well as in the interest of the entire nation, Canada should have as an objective a self-supporting, market orientated agriculture.

AGRICULTURE IN THE NATIONAL ECONOMY

The economic life of a nation, the way its social and economic progress follow, reflects the manner it solves basic issues. A nation has to choose between consuming and investing. It must find a balance between a very legitimate desire for welfare, and the sacrifices necessary to prepare a richer future. It must reconcile its need to participate in international enterprises and co-operation, and its drive for national independence and self-assertion. These basic issues are reflected in the problems of every sector of the nation, and transcend all of them.

Agriculture, as well as other sectors of the nation, must settle its problems according to the criteria which are acceptable to the nation as a whole. Farmers should be committed to the same duties and entitled to the same privileges as other Canadian citizens.

A strong agricultural sector is an asset to our nation. This requires that the agricultural economy should be able to prosper without permanent and production orientated transfers; to satisfy our domestic demands for food to the extent of the productive capacity and comparative advantage, to reward to their full value, all the resources it can efficiently use; and to phase out and promote to other uses the resources it cannot reward satisfactorily, in such a manner consistent with the respect of human dignity and the preservation of our biological environment.

This ideal may be difficult to achieve. However, it would be useful to bear it in mind, and at regular

intervals measure how much our attempts to overcome the difficulties which beset agriculture have brought us closer to it.

One important consideration in striving for this ideal is to maintain the best position we can in international trade. This implies good commercial relationships with our trading partners, taking an active part in the international negotiations on trade and undertaking an intensive and aggressive approach to improving and developing new and traditional markets. Within Canada it implies effective and efficient marketing of agricultural products on the basis of comparative advantages and the best use of agricultural resources.

Developing agricultural policy to overcome the obstacles we have ahead of us at the beginning of this decade, will necessitate more communication and a greater interchange of ideas with all segments of the community and the rest of the economy than we have had in the past.

BROAD PHILOSOPHICAL APPROACH

The broad philosophical approach in Canada to agriculture has been that the federal government should provide the economic and legal framework and institutions for the self-development of farmers and the agricultural sector. Production and marketing of agricultural production takes place through the free enterprise system with prices of inputs and products determined in the market place. This implies a minimum of direct government intervention, production related to markets with programs designed to reinforce market requirements, and low trade barriers. In pursuit of these objectives, the major areas of government activity in agriculture involve a comprehensive program of agricultural research, a wide ranging system of grading and inspection of agricultural products for quality, disease and wholesomeness, the provision of long-term credit for commercial farmers, and a system of general agricultural statistics and market and trade data, including international and foreign agricultural information. A legal framework has also been provided which enables the establishment of farmer oriented supply and marketing organizations.

Programs and Problem Areas Modifying This Approach

Some modifications to this general approach are necessary because of specific problem areas and because of certain inherent features of agriculture. Price uncertainty and price variability in the market and competition from low priced imports makes production planning by farmers difficult and re-

sults in widely fluctuating farm incomes. The willingness of farmers to adjust to other types of farming is blunted by the very uncertainty existing for prices of other commodities. Safeguards against sharp price declines are provided in the initial payments system for wheat, oats and barley grown in Western Canada. For other products, the Agricultural Stabilization Act gives powers to establish the necessary price support.

The hazards of weather are unpredictable. The development of the Prairie Farm Assistance Act has assisted with this problem in the Prairies. More recently, the creation and continued expansion of a national system of crop insurance has given added protection against weather losses. In recent years, new agricultural trade policies have been established in many countries, production has increased in the developing nations and export demands and potential for Canadian farm produce have consequently changed. For some commodities, a special seasonal protection is necessary. For others, the problem of meeting changing demands and competing with highly subsidized exports remains difficult to overcome.

Agricultural technology becomes more complex and more costly in its application. The unit costs of most inputs essential for food production are rising faster than the prices received by farmers. This cost-price squeeze presses farmers every year and is difficult to overcome through rising productive efficiency. Firms are continually becoming larger in the farm product and food marketing system. This is taking place in retailing, wholesaling and processing, as well as in the farm input sector. Thus, the farmer is under constant pressure to expand his scale of operation, and in addition, is in need of greater bargaining strength to match the power of agribusiness.

Not all agricultural sectors have been able to make sufficient structural adjustments to withstand some of the more severe international competition in the face of rising production costs. Programs have been introduced to restrict this competition and provide income supplement and price support. The major sector with such a program is the industrial milk industry which is continuing to make significant production and structural changes but where farm incomes on average remain low.

The marketing system should ensure that the farmers receive the highest possible return for their products and that consumers are obtaining what they want as food products and in the form and place they want them at the lowest possible cost. In other words, the marketing system must be efficient and

operate at the lowest cost while ensuring the consumer demands are clearly made known to producers. While consumers pay more for food as they demand more marketing services such as processing, packaging and convenience, the farmer's share of this money spent on food tends to fall, since these demands do not increase farm product prices.

Major changes in the production structure of farming across Canada have occurred as farm size has expanded and the number of farms has decreased. Many small farms have ceased to exist. Even so, wide disparities in average farm income still exist between regions of the country and between farmers. Over one-third of Canadian farmers are earning very low incomes from agriculture. Different government programs are in effect to accelerate improved structure but the income problem remains large and severe.

BASIC PROGRAM AREAS

Income from Agriculture

The major objective of farming is to provide and increase income for farm family living taking into account the advantages and disadvantages of rural surroundings. The monetary, commercial system operates within the broad framework maintained by the government for the continued growth of the nation. But within agriculture there are problems with achieving this income objective. With many products farmers produce, incomes are subject to wide fluctuations from one year to the next. In addition, the distribution of incomes among farmers is very diverse so that some earn relatively large returns, while others are in constant economic difficulties. Finally, many farmers do not receive a level of income that enables them to maintain living standards comparable to wages earned with the same basic skills in other occupations.

Income instability is a major problem in some types of farming. For most types of livestock production (cattle, hogs, eggs especially) there are considerable fluctuations in market prices from one year to another, even though the variation in production is often small. Similarly, in crop production, too, (cereals, other crops, fruits and vegetables), yields and prices and total sales can vary significantly from year to year. In a few commodities, for example, the dairy industry, there is more regularity in price and income but in general there are inherent difficulties with income stability in farming.

While an expanding economy has led to regularly increasing wages and costs in many non-farm occupations, farm product prices have, in general, not increased at the same rate over the years. Costs of

most items required for production have increased. Some farmers, like many other industries, have been able to increase their bargaining strength with the non-farm community, to become a little more efficient, or to expand their size of business in order to improve their incomes in the face of rising costs. Nevertheless, there is a continuing disparity between the returns from farming and from other employment due in part to the resource immobility, both human and material, found in particular types of farming.

Many farmers have difficulty in making an adequate income because of their small size of farm or poor use of their resources. Those producers who have the desire and the potential to expand their operations or improve their management must be given a fair chance to succeed. Others, however, may find better employment and income opportunities outside agriculture despite the problems of changing occupations.

Policies to Improve Farm Incomes

There are many ways a farmer can improve his income. Some are directly under his control; others must be done in co-operation with his fellow farmers; still others need a national program for development and operation. In a large number of instances, help and assistance is provided through federal government programs, effective either on the production or the marketing side, and in a few cases on both.

Improving Productive Efficiency

Research is indispensable to keep farmers in the technical forefront. New discoveries are responsible for many of the changes which occur in our environment and one of the ways to adjust to these changes is to keep abreast of them. Technological progress abroad has priced out of the market some of our products. Advanced technology improves our ability to market production on a more competitive basis through lower prices. The government research program provides technological progress to ensure agriculture remains competitive and can diversify production. Provision of a comprehensive problem-oriented research program provides new and better varieties, new production techniques and new farming methods, all of which are needed to face the ever changing production problems. As costs continue to rise, the traditional markets for Canadian products shrink and competition from other suppliers becomes severe, questions are asked about the proper emphasis of the research program, on the essential problems to be solved, on the priorities and the need for economic solutions.

As well as research, a series of programs has been developed to maintain and improve the quality of Canadian crops and livestock. These programs are many and varied. They include the testing of the record of performance for all types of livestock, grants to agricultural fairs and prizes to encourage better quality animals. Seed and variety testing and certification ensure improvement of varieties and maintain quality markets. Farmers must ensure they benefit fully from these programs. In addition, there are several programs of inspection, prohibition and quarantine, which protect existing quality crops and livestock against imports of disease and pests, and which help farmers avoid varieties and types of lower quality.

Weather is a major hazard in agriculture and is particularly severe on annual crop yields. In the Prairies, the **Prairie Farm Assistance Act** has provided some compensation against the vagaries of weather for many years. More recently, the **Crop Insurance Act** has permitted the establishment of a national system of insurance against below average crop yields. As the system spreads more completely across Canada and becomes refined for specialized crops and takes account of local conditions, farmers will be able to obtain full protection against inclement weather.

One result of the increasing complexity and sophistication of farm practice and technology has been the need for regular and complete financial and accounting data for farmers. Farm management requires not only basic data about the farm but comparisons to see how other farms make out in managing similar crops and livestock. The Canada Department of Agriculture, in co-operation with the provinces, has initiated in **CANFARM** a comprehensive national accounting program available at many optional levels to meet the different needs of farmers. The program provides a method of improving decision making at the farm level by establishing a mechanism to satisfy the urgent need for more accurate and timely farm data and a source of regular farm management information.

Farmers have had to keep abreast of many changes in production methods and faster developments can be anticipated in the future. Research can seek out better methods. **CANFARM** can show each farmer the strengths and weaknesses of his farm business. The largest input into a scientifically based agriculture is capital, and thus, the credit needs of farming will continue to increase. **The Farm Credit Corporation** provides credit for farm development and expansion and for equipment. Recent changes in the credit program now enable it to help farmers

meet the challenge of new production patterns and system for more efficient and competitive food production.

Improving Marketing

Canadian farmers market all types of farm and food products within Canada, the United States and many countries overseas. A major problem for farm planning is the widely fluctuating prices in the market. In order to provide a minimum security against this uncertainty of market prices, the federal government guarantees initial prices for Prairie wheat, barley, and oats. Similarly, minimum guarantees are available for livestock and livestock products, eastern grain and other crops under the **Agricultural Stabilization Act**. The system is flexible enough so that prices to farmers can and do rise above these minimum levels when markets are good.

Where farmers wish to organize their own marketing, the **Agricultural Products Co-Operative Marketing Act** provides a government guarantee on an initial price through a farmer co-operative. In a few cases, the market is not able to provide sufficient income to producers of certain products. In the manufacturing milk industry direct payments are made to producers to ensure adequate returns, to assist with exports, to keep production in line with limited market opportunities and to encourage the adjustment of dairy farms and herds to more efficient sizes. The bulk of world sugar exports trade under special price arrangements and the residue fluctuates at lower "free" price levels. As Canada buys its imports on this "free" market, the price is often below a satisfactory level of returns for Canadian sugar beet producers and a payment is made up to a previously established level each year. To maintain and expand markets through the creation of consumer confidence, an extensive system of grading agricultural products has been established under federal government authority. A large number of graders and inspectors operate throughout Canada to ensure that, not only all Canadian products marketed are properly graded for the farmer and the consumer, but that products exported and imported are likewise graded. Meat undergoes special inspection against disease and to ensure that it is wholesome food for the consumer.

Exports of farm products have been averaging about 20 percent of all farm revenue. Imports are almost as important, although much of them are products Canada cannot produce efficiently or at all because of season and climate. To increase farm income and to use to the full our agricultural resources, especially

land and people, exports must be maintained and increased. During the past few years, our exports have been challenged more seriously than ever before. Not only is the pattern of demand changing, but competitors have developed more aggressive programs of grading, pricing and marketing. Large supplies of competitive products on our traditional markets can result in depressed prices and they are often helped by large export subsidies. **Canadian farmers are protected within Canada by our anti-dumping legislation.**

Because of the significance of trade to the Canadian agricultural community, **Canada plays an active role in international negotiation for freer agricultural trade** through FAO, GATT, OECD and other international organizations. In addition, membership is held in several important commodity agreements—grains, sugar, coffee. In order to improve the opportunities for Canadian farm products abroad, many different types of activities are performed with unequal results. Efforts are made to lower tariffs in other countries for our products. Persuasion, reasoning and pressure are brought to bear on other countries to keep within limits their subsidies on agricultural products and particularly on their exports. Fair competition in trade is vital to a country depending on agricultural exports to the extent which Canada does. This position is made clear in all international forums and all advantages are taken to promote such a concept. Unfortunately, most of the industrialized countries are slipping slowly but significantly towards an increase in protectionism. Canada is using all its international skills and resources in order to hold and reverse this trend.

Within this rapidly changing production technology, market pattern and world demand, **the federal government maintains a large and regular flow of statistical production and marketing information** for farmers, agri-business and governments. It includes, basic agricultural statistics, day-by-day price and market information on all commodities produced in Canada and a steady flow of reports from Canadian representatives abroad. Linked closely with this basic information is the recently expanded Outlook program providing guidelines to farmers as to future market trends and developments to assist in farm planning.

The size of the demand for each product in relation to supply influences the farmers' market price. The efficiency of the market determines the share of the consumer's food dollar that gets back to the farmer. With consumers seeking more services, the farmer's prices are constantly under pressure. Thus, the organization of marketing becomes important

and more particularly, as the large scale marketing organizations have become so impressive in food retailing, processing and wholesaling in recent years. A combination of provincial and federal legislation has enabled the establishment of producer-controlled marketing boards and also marketing commissions involving all sections of the system. With increasing importance and size of food marketing, the assurance of greater bargaining power for producers is significant but along with it goes the need to minimize marketing costs. The implementation of legislation to permit the establishment of national marketing boards will help overcome some of the problems.

AGRICULTURAL ADJUSTMENT

The need for adjustment within agriculture is great and so are the returns to adjustment. Major structural adjustments are required if farm people are to have equality of economic opportunity with those in other sectors and if farmers are to earn returns to resources comparable to those in other industries. Even given modest increases in foreign and domestic demand, Canada has something like twice the number of farms that the sales of its agricultural products can support. The federal government is developing policies of market expansion and policies of adjustment. These latter policies are designed to improve the opportunities available to farm people—opportunities on the farm and opportunities off the farm. They are designed to help farm people overcome the constraints or barriers to adjustment. They are designed to help the farmer find a better job or build a better farm business.

Farm Credit

The **Farm Credit Corporation** has been established in order to provide long-term mortgage credit tailored to the needs of Canadian farmers to help develop viable family farm businesses. Loans are made available for land purchase by farmers and for capital equipment and for livestock to enable the adjustment of production to meet market needs. In addition, loans are provided to groups or syndicates of farmers organized to share in the purchase and use of farm machinery, buildings and installed equipment. The essential objective of these credit programs is to provide capital for the development of a competitive and efficient agricultural industry.

Special Agricultural Programs

There is a wide range of programs, many operated by other federal departments which are of direct significance to agriculture or assistance to farmers.

The Canadian food aid programs, and particularly the Canadian contributions to the UN/FAO **World Food Program** contribute food to needy people in other countries and increase the market for Canadian products. Of more direct aid to exports is the extensive **Trade Commissioner Service** operating throughout the world to provide information, contacts and promotion in foreign markets. Added to this are the trade missions sent to particular countries and regions to explore and develop markets.

On the financial side, farmers receive a number of **advantages in submission of income tax** returns including use of the cash method, averaging years, and rapid write-offs for certain kinds of capital equipment. The **Farm Improvement Loans** provide a government guarantee to bank credit for new livestock and equipment to assist with farm development and commodity adjustment.

Several programs have particular regional significance. The **Prairie Farm Rehabilitation Act** provides for conservation and water development for agricultural and rural areas in the prairies. The **Agriculture Rehabilitation and Development Act** has enabled a wide range of rural programs to be developed in particular areas, including assistance of land improvement and consolidation. The **Fund for Rural Economic Development** established an integrated approach with large new investment in rural development in Prince Edward Island, the Gaspé, the Interlake region of Manitoba and New Brunswick. **Manpower training** programs provide subsistence payments for retraining of farm people in basic skills and occupations both within agriculture and for other occupations.

The **Temporary Wheat Reserves Act** provides for the payment of storage and interest costs on Canadian Wheat Board stocks of wheat in commercial positions in excess of 178 million bushels at the commencement of the crop year. When Western grain producers are unable to make deliveries due to lack of country elevator storage space, interest free cash advances are made available to them on farm-stored grain under the **Prairie Grain Advance Payments Act**.

COMMODITIES

Grains and Oilseeds

Between 1963 and 1966, Canadian exports of wheat were at high levels due to large sales to Communist-bloc countries. In response to the favorable wheat prices and marketing opportunities, significant acreages of new Prairie land were brought into production and fertilizer use expanded greatly.

Since 1967, marketing opportunities for most grains have been restricted, farm cash incomes from grain have fallen to low levels and stocks have risen. The impact of reduced farm spending has been felt throughout the entire economy, but especially in the Prairie towns and villages.

Recently, the export demand for Canadian wheat and feed grains has improved because of poor crops in a number of European countries and corn blight problems in the United States. The situation could be quite different next year. Excess productive capacity for Prairie grain and oilseed crops on the basis of probable markets will exist over the next few years. There is likely to be a steady growth in oilseed marketing for export over the next few years. Expansion in feed grains and pasture and fodder for domestic livestock production could use some of the excess land. No further increase in the cultivated land area is required in the near future.

In addition to the short-run excess land, there are also many farmers who are unlikely to realize adequate returns in crops production because of the small size of their operations. During the past few years, marketing problems have focused attention away from the chronic income problem of small farmers and the cost-price squeeze facing all farmers.

Canada must be ever conscious of its competitive position in world grain markets. This will require that resource use adjustments continue at a rapid pace. In addition to providing assistance and alternatives to low income farmers, the economic framework must permit the larger scale producers to achieve maximum efficiency. This may necessitate greater emphasis on mechanisms to reduce the impact of yield, price and marketing variabilities. Lack of opportunity to deliver grains is often a bigger problem than fluctuations in yield. Markets and quotas must direct production towards market demands. Marketing procedures and systems must ensure increased market penetration and efficient handling and transportation. These must give the production and marketing system sufficient flexibility to accommodate rapid changes in export situations. In addition, there must be a continuous process of up-dating the system of pricing to producers, grades, quality, handling, storage and transportation.

The **Canada Grains Act** and the **Canadian Wheat Board** provide quality standards and a mechanism for marketing prairie grains that enable the Canadian grain industry to achieve an excellent record in world markets. But markets have become more competitive and import requirements for wheat, feed grains and oilseeds have changed. The **Federal Task**

Force has made many recommendations in this sector designed to emphasize the need to be market-oriented and to create flexibility in the production system. Severe short-term adjustments have to be made. The longer run trends and needs must be clearly understood, including the difficulties of adding precision to specific yearly export demand forecasts.

New policy and programs were proposed for western grains in October 1970 to encourage levels of crop production consistent with market demands, to maintain and expand markets, and to offset the adverse effects of yearly fluctuations in farm cash receipts. Guidance in crop production would be given to producers through the levels of initial prices established for the different cereal grains, through improved and more timely market information, and a revised system of grain quotas. As part of a concerted effort to expand trade, the government would support market development up to \$10 million annually. Livestock production would be encouraged to increase domestic grain markets and to decrease the pressure of surplus productive capacity in grains through increased forage acreage. Finally, in those years when cash receipts from grains and oilseeds are below average, farm cash receipts would be maintained through a stabilization program.*

Dairy

The dairy industry is a large sector of Canadian agriculture in terms of number of people employed, gross receipts earned and in its contributions to the daily food needs of all Canadians. However, it is **an industry with persistent economic problems**. These arise out of the large numbers of dairy products and the declining per capita consumption of most of them, the impact of national policies on international prices for these foods and the production structure of the Canadian dairy industry. The aggregate demand for dairy products in Canada is expanding at a slow rate which is even lower than the rate of the population growth. Substitutes offer increased potential competition for many dairy products. Exports face very strong and often heavily subsidized competition, so that export prices are low.

A large number of milk producers are small in scale of operation especially those selling industrial milk. The regularity of cash receipts and the re-

latively low capital costs have kept a large number of small producers in dairying. However, the incomes of many of these small scale dairy farmers are low. They often have high production costs because of difficulties in introducing better management and adopting modern production methods. With their small scale operations, they have considerable difficulties in switching to different enterprises, especially as the fixed assets in dairy farming are not readily adaptable to other enterprises. At the same time, both farm and off-farm alternatives are severely limited in the major industrial milk producing regions.

The federal dairy program, which has evolved over the years, has improved income levels of dairy farmers in the short run. At the same time, the program has brought about major structural changes in the industry. In addition, support prices for dairy products have provided greater seasonal price stability for producers. In common with any industry that derives a relatively large proportion of its income from subsidy, the element of uncertainty as to future policy and prices, which has prevailed for some time, impedes rational investment and development of the industry.

Many milk processing and distribution firms are also having serious economic problems. Many plants suffer from insufficient scale of operations to keep processing costs competitive. Federal price supports for dairy products have reduced short run uncertainty for processors, but there remains excess plant capacity and high processing costs. Rationalization within the processing and distribution sector will be needed in line with future domestic and exports potential and must also be undertaken in close conjunction with the future adjustments in the production sector.

The Federal Task Force on Agriculture has recommended that the subsidy programs of the Canadian Dairy Commission should be redesigned to increase the adjustment process of the industry and to make it much more efficient and market-oriented. With this in mind, they suggest that the Canadian Dairy Commission should announce general programs five years in advance, including ranges of prices or physical targets. This advance knowledge could give producers a better basis for assessing their longer term investment and employment opportunities within the dairy industry. Thus, some farmers would be able to plan a profitable expansion of their dairy operations, others would need to explore profitable moves into other agricultural enterprises and still others would need to seek employment opportunities in non-farm occupations.

*These proposals are being revised continually. An early condensed version is available in *Farm Letter* (Prairie Grains Policy Proposals, November, 1970) from Information Division, C.D.A. Sir John Carling Building, Ottawa. K1A 0C5.

Even with the major structural changes that have already taken place, the dairy subsidy remains large and there are still problems of excess production over demand. Subsidy programs have to include some element of production restraint. The ultimate policy objective should be to create a dairy industry as efficient, profitable and self-supporting as possible. The required programs will not be easy to establish if at the same time the human problems are to be minimized.

Cattle and Hogs

Rising standards of living and a growing domestic population provide an **optimistic outlook for beef consumption**. The longer term Canadian demand for pork is also increasing but not as rapidly as for beef. Both beef and pork production in Canada have risen steadily over the last several decades. In the last four years, beef prices to consumers have increased more rapidly and imports of both pork and beef have risen. In the current year, hog prices in particular are lower than last year. Thus, there are both long-term trends and short-term situations to consider.

The favorable long-term demand outlook for beef will necessitate a significant expansion in feeder cattle production. There is some opportunity for greater beef cow numbers in Eastern Canada. The excess productive potential in grain and oilseeds in the Prairies will allow the expansion of livestock operations in that region.

Low tariffs exist between Canada and the United States for cattle and hogs. Hence, the price levels set in the U.S. have immediate effect in Canada and imports come in readily. Similarly, to increase exports to the U.S. means that Canadian producers would have to compete directly with U.S. producers. While distress-level feed grain prices in Western Canada do lessen the cost of production, providing they are not offset by higher feeder cattle prices, we cannot expect to develop a viable long-term beef and hog industry on this basis. Thus, price instability of Canadian feed grains is of major concern.

Recent agricultural policy has been concerned with facilitating expanded livestock production to utilize surplus feed grains and land resources. The Operation LIFT program has encouraged the seeding of grain-land to permanent forages in the Prairies. (Some provincial governments also have incentive programs for grass seeding and some have either subsidized or guaranteed credit for increasing livestock production). Aside from low tariffs, provi-

sions of the Agricultural Stabilization Act, recent incentives for expanding grassland in the Prairies, and encouraging the improvement of livestock quality (R. O. P., etc.), no explicit programs operate in this sector. The **Feed Freight Assistance Policy** has the objective of providing a stabilizing influence on the costs of feed grains for cattle, dairy, hogs, poultry and sheep in Eastern Canada and British Columbia as well as an increased market for Western grains.

The Federal Task Force on Agriculture has recommended that **Canadian producers should aim to export about 500,000 head per year of feeder cattle** by 1980 compared with 100,000 to 350,000 head per year during recent years. The Task Force is not optimistic about the ability of Canada to compete sufficiently to lead to any significant exports of finished cattle. However, they do recommend the removal of all tariffs on cattle and beef in a movement towards a continental meat market. Likewise, they advise that all tariffs on feed and equipment used in producing and processing livestock should be eliminated in order to equalize production costs. Within Canada, it is suggested that the Canadian Dairy Commission provide incentives for milk producers to move into beef production. This is particularly emphasized as desirable in the industrial milk producing area of Quebec and Ontario. For the Prairies, it is recommended that some of the monies now spent through the Temporary Wheat Reserves Act be used to encourage the diversion of resources from grains to cattle production.

There will be a growing market for beef and pork, within Canada and opportunities for increasing exports to the U.S. and some other areas.

Poultry and Eggs

Poultry and egg production have undergone major changes since commercial broiler production technology was introduced in Canada in the 1950's. Output and domestic consumption of poultry meat has greatly expanded, scale of operations has increased significantly and the number of producers has declined drastically. Vertical integration between feed manufacturers and producers has become prevalent with feed manufacturers owning or controlling a large number of broiler and turkey hatcheries and poultry processing plants.

Demand prospects for poultry meat are good for chicken and turkey, particularly broilers. The outlook for eggs is not quite as good, as a continued decline in per capita consumption is expected. One of the most striking problems facing this industry is

the rapidly expanding and sometimes uncontrolled supplies which have lead to periodic gluts and distress prices. This results in severe competition at certain times for various principal markets. Egg production still retains about a two-year cyclical pattern which gives rise to great instability in prices.

The Federal Task Force on Agriculture recommends that present tariffs structures on poultry and eggs be retained. **It is unlikely that continuous exports of any significance can be developed.** They also warn that any moves towards national marketing boards for poultry and eggs must be closely scrutinized to ensure that they do not lead to reduce productive efficiency in Canada. Since the production structure in this sector is well organized, policies need to concentrate on problems of the national organization of marketing to ensure regional economic efficiency for all of Canada and to prevent the isolation of particular regions from the comparative production and marketing advantages of other areas.

Fruit and Vegetables

This industry is complicated out of proportion to farm cash receipts and export income because of the many fruits and vegetables involved, the widespread locations of production, processing and distribution and the limitations of Canadian climate. Not only are there a large number of products, but they have greatly different significance to the economies of different regions. Some of these crops have a high degree of specialization and hence assume extreme importance within localized areas. The Maritimes receive 40 percent of cash farm income from fruits and vegetables; whereas, the Prairies receive only a very small proportion. Furthermore, while tariffs are relatively low, imports far exceed exports, although much of this is out-of-season or non-competitive produce.

The demand prospect for fruit and vegetables in the future is good. While on a per capita basis there will be a shift to consumption of more processed products, population growth will give a greater consumption of both fresh and processed fruits and vegetables. With the considerable range of crops, the problems of the industry are many and varied. The two big crops are potatoes and apples.

For potatoes, the price instability has been very severe, even though considerable changes have been made in the production structure with a reduction in the number of potato producers and an increase in acres grown. Tariff quota limits access to the United States market and sometimes leads to lower Canadian prices. The organization of marketing is complicated

because the bulk of the crop has to move outside the province of production, often in competition with local supplies.

The apple industry is also subject to some difficult price variability. The widely located industry is variably organized in large co-operatives, producer marketing boards and marketing commissions. While considerable general co-operation exists, greater development of research in marketing is required on a national basis.

The major concern with this sector of agriculture is how can the Canadian industry match the growing demand and to what extent it can expand competitively. The Task Force recommends that, in general, the tariff structure should remain, but that particularly for potatoes and a group of other commodities (onions, carrots, turnips, cole crops and cranberries), free trade should be negotiated with the United States. It also suggests wider use of producer marketing boards; the development of quicker relief against dumping and injury from low priced imports; more incentives to all sectors of the processing industry; better crop insurance; and more marketing research and development.

The removal of tariff protection on commodities needs careful evaluation to assess the benefit to be obtained. In addition, it requires negotiation, especially with the United States, to obtain the advantages to export to that country. Wider use of producer marketing boards depends on local producers' interest in such boards but a federal policy to provide for national marketing boards should also help.

Other Products

Canadian farmers produce a very wide range of crops and livestock. Many of these have special problems; some have given rise to specifically designed production or marketing programs. Sugar beet, which is only produced in certain areas, has a specially established price because "free" world sugar prices can be very volatile and fall to low levels at times. On these occasions payments are made to producers. "Free" world prices at which Canada buys fluctuate greatly because the bulk of world sugar exports trade under special price arrangements.

The tobacco industry has high protection levels which ensure that domestic production is the preferred product. A local marketing board in Ontario applies a policy of regulating acreage in order to maintain price to producers and this has created some competition in other provinces. A further problem is that of increasing exports in the face of prices prevailing in other exporting countries.

Encouragement is given to the development of markets for other crops and some support is given in a few cases to organizations designed to achieve this. There are many miscellaneous crops—white and yellow beans, soybeans, corn, grain and forage seeds, buckwheat, mustard and so forth. The wide range and relatively small markets seldom call for special treatment. These crops, however, benefit from the general programs of research, quality grading, and marketing information.

CONCLUSION

Agricultural Policy for the Future

Both farming and the agribusiness sectors of agriculture must be thriving and progressive. As a vital part of the Canadian economy, **agriculture should provide a return to all sectors which will enable a livelihood equivalent to that obtained by other sectors of the economy.** The needs of Canadian consumers for food and farm products must be supplied in fair competition with other suppliers insofar as possible. This implies that consumers will be prepared to pay for wholesomeness, freshness and high quality. At the same time, agriculture should be viable and self-sustaining with transfer payments from other sectors based on the need to protect farmers against unfair competition and to permit the necessary adjustment and transition in the uncompetitive commodities or regions.

Canadian agricultural policy has evolved over a period of years. In part, it is defined by a number of specific programs which have been implemented to deal with certain problem areas. These have focused on the problems of agriculture but this **policy must be consistent with the philosophy and objectives of all parts of the Canadian economy.** Hence, in the formulation of agricultural policy for the future and the development of specific programs, the effect on the social structure of the economy,

impact on consumers of agricultural products and the required treasury expenditures must also be carefully considered. **Agricultural policy and the manner in which financial transfers are made to agriculture must be explicitly conceived so as to make the maximum contribution to the success of the general economic policy of Canada** and to bridge the gap between the income of farmers and those in other sectors. Our short term interests and actions must be reconciled with our long term philosophy and objectives.

The food and export markets of the future will change and fluctuate rapidly, technological advance will be fast, policies of competition will be strong and nationalistic, the number of Canadian farmers and the sizes of farms will change. An important function of the federal government will be to provide more information on these changes and to indicate direction to all involved in agriculture.

With these rapidly changing economic circumstances of the 1970's, it will be necessary that a considerable degree of flexibility be built into all agricultural programs. Furthermore, existing programs must be continually assessed to determine whether they should be terminated or replaced by new ones. Under these circumstances, the task of policy formulation and program development will be more difficult than in the past. **Active participation will be required by farmers, agribusiness, universities and all levels of government to be sure that the goals, policies and programs meet the needs of the uncertain future.** It will be necessary to adapt our thinking and actions to a new and more dynamic setting. It will not be easy. The goal should be to create a commercial agriculture that is economically viable and self-sufficient and to do it within the current generation. It will require work and involvement by all concerned and the federal government will provide leadership to this vital and fundamental industry.

IN AERIAL SPRAYING, TURNS COST MONEY

*It is cheaper to aerial spray a long field than a short one—
14 cents an acre cheaper!*



*Laurie Philpotts**

One of the most popular recommendations for farm improvement has long been to increase field size. This will reduce turning time and allow the use of larger, faster, more powerful equipment. This trend will continue and may find its logical conclusion in the widespread use of airplanes in agriculture. Moreover, as soil compaction, and damage to crops becomes more serious with increased machinery weight and size, the trend to aerial agricultural equipment will accelerate.

Pilots operating crop dusting and spraying planes have known that a long field is easier to work than a short one, since there are fewer turns per acre. Since their work was easier and faster, these pilots have long suspected that their costs were lower with longer fields. This paper presents the data from one experiment which measured the pilots' suspicions.

In May 1970, an experiment was done to measure the flying time on swath runs and on turns within a grain field 60 acres in size and one half mile in length.

Location of field

The field found near Briercrest, Saskatchewan was situated on lacustrine-outwash soils having a level or undulating topography and an altitude of 1880 feet. Utility wires were located at one end of the field.

*Mr. L. E. Philpotts has been working with CDA for over 20 years. He has combined extensive training in aviation and economics to become a leading authority on the economic application of aviation technology to agriculture.

Aircraft and operation

The aircraft, privately operated, had a horsepower rating of 180 with a fixed airscrew being used. The application equipment consisted of a Sorenson belly tank having a capacity of about 74 Imperial gallons. The aircraft was flown at an airspeed of about 95 miles per hour while distributing about 0.5 gallon of liquid herbicide (ester) per acre using a swath width of about 50 feet.

The experiment was conducted during the pre-sunset hours when the air temperature at ground level was 82°F and the cross-wind was of negligible effect at 2 to 3 miles per hour.

One flagman was used as a marker and paced the swath paths across the field at a position near mid field.

Measurements

A simple stop watch was used to measure the time in seconds on the swaths and on the turns. (Figure 1 indicates the procedure of turns flown by the pilot). The seconds were converted to minutes for this report.

The time was registered for 10 of the 20 swaths flown over the 60 acre field, and for 10 of the 19 turns needed in the spraying operation.

The average time per swath was 18.8 seconds over the one half mile run while the average time per turn was 40.5 seconds ranging from 39 to 42 seconds.

PROCEDURE-TURNS, DRAWN TO SCALE

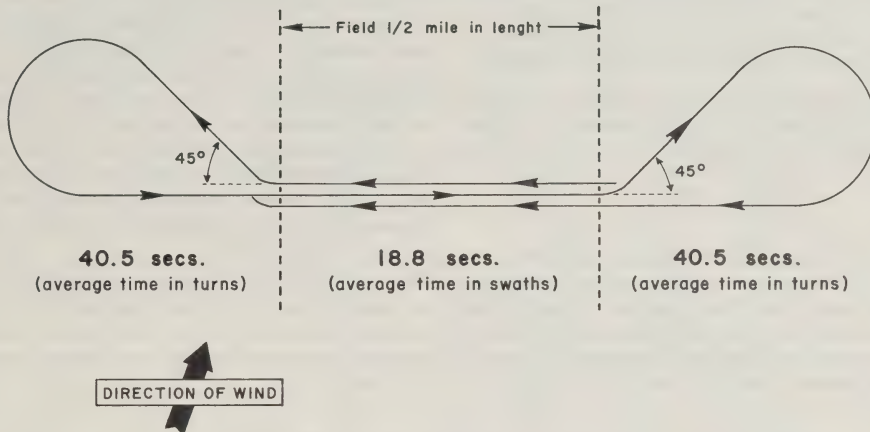


FIGURE 1



Generally, the time on the turns represents about 67 percent of the combined time on turns and on swaths. In addition, ferrying to home base to refill the tank would keep the plane from effective work much longer than 67 percent of its total time of operation.

When considering the one half mile and one mile fields having the same acreage, it can be seen from Table 1 that while the swath mileage remains comparable, the number of turns is generally about 50 percent greater for the one half mile configurations.

Table 2 and Figure 2 show the number of minutes relevant to the one half mile and one mile configurations where the fields each have the same number of acres.

Costs

The cost of flying the 180 horsepower aircraft was about \$50.00 per hour or \$.83 per minute. Using this cost per minute as a base, the cost, including only the swath and turn costs, to aerial spray the various one half mile and one mile fields with equal acreages was calculated. Table 3 points out the benefit of

spraying the fields with the one mile length. The savings vary from \$5.75 at the 40 acre size to \$21.33 for the field containing 160 acres.

Comments

It is not known how many one half mile and one mile fields are aerial sprayed in the Prairie Provinces during the spraying season, but, it is obvious that the operators of aircraft distributing chemicals and other materials for agricultural purposes would like to have all fields at least one mile in length. Further, it is perceivable that farmers may benefit according to their operation costs if they were to be able to elongate an acreage to at least one mile in length. This is assuming that the farmers and the operator were to co-operate in relation to the lengthening of the fields and a comparable charge in dollars per acre for the spraying service.

This small experiment was not a sophisticated one in the time-motion context, but, it served to point out that the fewer the number of turns executed in aerial spraying operations, the less the relative operating cost per acre.

TABLE 1—NUMBER OF SWATH MILES AND TURNS NEEDED TO AERIAL SPRAY FIELDS, 40 to 160 ACRES, ONE-HALF MILE AND ONE MILE IN LENGTH.

Size of field	Number of Swaths*		Number of swath miles		Number of turns	
	Field ½ mile in length	Field 1 mile in length	Field ½ mile in length	Field 1 mile in length	Field ½ mile in length	Field 1 mile in length
acres	— number —		— miles —		— number —	
40.....	14	7	7	7	13	6
60.....	20	10	10	10	19	9
80.....	27	14	13.5	14	26	13
100.....	33	17	16.5	17	32	16
120.....	40	20	20	20	39	19
140.....	47	24	23.5	24	46	23
160.....	53	27	26.5	27	52	26

*50 foot swath width.

TABLE 2—TIME NEEDED TO FLY SWATHS AND TURNS IN FIELDS, 40 TO 160 ACRES, ONE-HALF MILE AND ONE MILE IN LENGTH.

Size of field	Swaths*		Total time in minutes Turns		Total for field	
	Field ½ mile in length	Field 1 mile in length	Field ½ mile in length	Field 1 mile in length	Field ½ mile in length	Field 1 mile in length
acres			— minutes —			
40.....	4.39	2.19	8.78	4.05	13.17	6.24
60.....	6.27	3.13	12.83	6.08	19.10	9.21
80.....	8.46	4.39	17.55	8.78	26.01	13.17
100.....	10.34	5.33	21.60	10.80	31.94	16.13
120.....	12.53	6.27	26.33	12.83	38.86	19.10
140.....	14.73	7.52	31.05	15.53	45.78	23.05
160.....	16.61	8.46	35.10	17.55	51.71	26.01

*50 foot swath width.

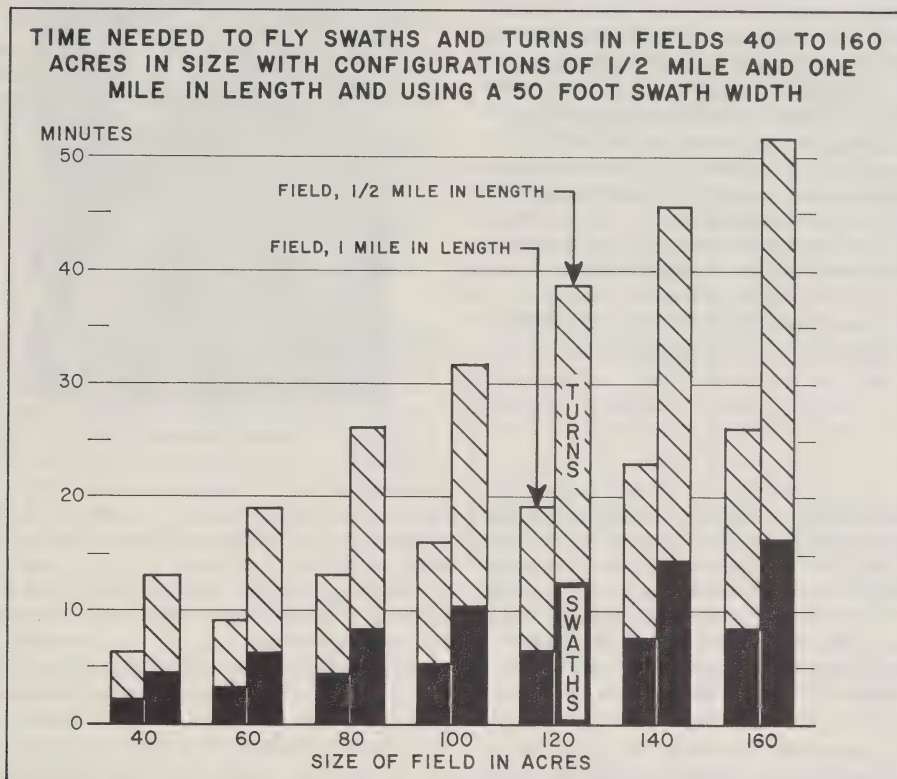


FIGURE 2

TABLE 3—FLYING COSTS SAVED IN SPRAYING FIELDS ONE MILE LONG COMPARED TO FIELDS WITH EQUAL ACREAGE, BUT, ONE-HALF MILE LONG.

Size of field acres	Cost to spray ⁽¹⁾		Benefit by spraying the 1 mile length.
	Field 1/2 mile in length	Field 1 mile in length	
	— dollars —		
40.....	10.93	5.18	5.75
60.....	15.85	7.64	8.21
80.....	21.59	10.93	10.66
100.....	26.51	13.39	13.12
120.....	32.25	15.85	16.14
140.....	38.00	19.13	18.87
160.....	49.92	21.59	21.33

⁽¹⁾Includes swaths (50 feet) and turns, but, does not include ferrying between base and field.

Acknowledgements

The author thanks Mr. Allan Findlay for authorizing the use of the data, especially, when Mr. Findlay flew the operation not knowing that the time measurements were being taken. Acknowledgement is also given to Mr. Rhéal Lafrance who drew the graphs for this article.

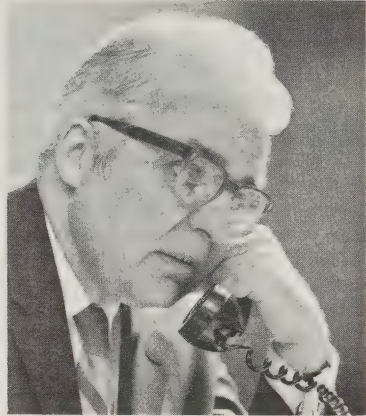
PROBING RURAL CHANGE

"[F]armers have adjusted to external changes more rapidly than . . . rural communities."

"[T]he Board of Grain Commissioners [has] not been regulating the grain warehousing industry in a proper manner, inasmuch as they have never known the average cost of each elevator service at each elevator."

"Improper price regulation of the grain warehousing industry results in the trapping of people in moribund communities."

"In my opinion, the demise of the Temporary Wheat Reserves Act cannot come too soon."



*John Channon**

When we were discussing this topic, a colleague suggested a fashionable, multi-worded title, "The Social and Economic Problems Arising from Changes in Rural Agriculture." I countered with an even longer title, "The Social and Economic Problems Arising from the Slow Rate of Adjustment to Changes in Rural Agriculture." However, we settled upon a much simpler, although perhaps not so descriptive a title, "Probing Rural Change."

At this juncture, I would like to clarify a point that has at other times generated a small problem for me. The point is that whatever I happen to write in this paper must not be construed as emanating from anyone but me. My Minister is not in any way associated with these thoughts. They are my own biases, stemming in the main from my experiences in Manitoba and my examination of many, many detailed statistics describing individual rural communities in Western Canada. I do not object to disclosing my biases, and I am willing to listen to yours, but please allow me the privilege of insulating my Minister from whatever ideas and comments I write at this moment.

This article is based on a speech presented to the Manitoba Institute of Agrologists, Winnipeg, Nov. 16, 1970.

*Mr. J. W. Channon has been an economist for many years and is now Special Advisor on Grain Policy. It is hoped that his straightforward approach to this serious problem will prompt reader reaction. Mr. Channon may be contacted through the Economics Branch, CDA, Ottawa. KIA OC5.

I hope that the juxtaposition of my ideas and the ones you happen to be entertaining as you read will spawn newer and better ideas. Much of what I write is in the nature of thinking out loud and intended to stimulate thinking rather than to convey some authoritative message.

So, let us now get on with the task of "Probing Rural Change." **What I wish to concentrate on, is the change in rural communities rather than the changes in farming techniques, farm structure, or farm management.** My feeling is that farmers have adjusted to external changes more rapidly than have rural communities, which have been subjected to more stringent regulation. My interest in the effect of change in rural communities stems, in the main, from my association with a group of people in Ottawa who have been carrying out a series of Prairie Regional Studies in Economic Geography.

In these studies, the emphasis is placed on grain farms and the communities and facilities serving these farms. They have turned out to be a collection of details describing the basic structures and socio-economic activities of the chosen micro-region. In all, we are aiming at about thirty or so such reports. The attempt has been to help the readers to gain an appreciation of the relative importance of the communities and the grain farms in the hinterlands of the communities. The reports offer little overt analysis and they do not attempt to arrive at conclusions and findings. The basis of some of the reasoning in this article was drawn from these studies.

In presenting the material, we adopted a method of ranking communities which, while not perfect, has proven to make possible the disclosure of some perhaps subtle, yet significant points. In each study, our tabular material dealing with the activity in the communities maintains the same hierarchy of grain delivery points. This hierarchy is based on the number of services available in each community. We have segregated communities into:

- a) those too small to classify at all (mainly sites of one or two prairie sentinels on otherwise bald prairie);
- b) hamlets, which offer from two to eight services;
- c) villages offering nine to 32 services;
- d) towns, 33 to 59 services;
- e) greater towns, offering over 60 services.

When this ranking is used, the time series of a range of variables begins to tell a story. Generally, it is this: **the small communities are getting smaller and the large communities are getting larger.** I will not quarrel with any reader who wishes to assert that this is conventional wisdom. However, it is interesting to have evidence that points to this phenomenon holding;

- 1) not only for population but for school enrolment,
- 2) for post office revenue,
- 3) carload traffic originating or terminating at the community,
- 4) size of farm in the community hinterlands,
- 5) specified acreage of these farms,
- 6) the number of farmers delivering grain to the elevators situated in the community,
- 7) number of rented acres,
- 8) elevator storage capacity,
- 9) grain through-put.

We notice a similar effect in the average length of haul from farm to country elevators; that is, the distance is longer to the larger communities and is slowly getting even longer. Indeed, I am sure that each of these characteristics is readily explainable or rationalized. School enrolment could be expected to vary directly with the number of services, although the hand of the bureaucrat can be noticed in the choice of which schools close and which consolidate. Similarly, post office revenue and carload traffic can be accepted as a function of the number of services, which itself tends to be a function of population. **Generally, the larger the community, the larger is the grain hinterland surrounding it, and the greater and more varied is the activity in the area.**

From examining set after set of such statistics, from visiting hundreds of communities, and from carrying out windshield surveys, a thesis has developed. One

of my colleagues insist that this too is only conventional wisdom. Nevertheless, here is the thesis that seized us.

There are today in the Prairies a good number of communities that, despite everything that has been done to them, are viable and go-ahead places, that exhibit many of the characteristics that are searched for by those economists who espouse the "growth-centre" concept.

Moreover, these communities can be identified. The thesis moves farther and offers the suggestion that the development of these communities can be fostered by the judicious retrenchment of capital that is now spread too thinly (in a geographical sense) and by concentrating investment in these viable communities.

These are not the Winnipegs, Portages, or Brandons of the Prairies. I am referring to such places as Boissevain, Killarney, Melita, Carman, Souris, Virden, Treherne, Russel, and Swan River.

We found that the grain delivery points we looked at in southern and western Manitoba break down roughly into 40 percent declining communities, 35 percent stagnant, and 25 percent showing signs of healthy growth. It is this latter quartile of the grain delivery points that should be favoured by governments, industry and commerce. All of the 25 percent are larger villages, towns or greater towns. I have not recently looked at data for the two other provinces, but I have no reason to believe that the situation is significantly different there.

I suggest, then, that these are the communities that will benefit from a shut-down of grain facilities in the other 75 percent of the shipping points.

It is text-book economics to state that proper price regulation dictates that the price permitted to be charged for a service must bear a direct relationship to the cost of providing that service. Otherwise, the system being regulated is inefficient. The application of this principle to the railway system has improved the economic efficiency of the railways and will go even farther as restrictive regulations are lifted. Being of this firm belief, **I have been known to argue that the Board of Grain Commissioners cannot have been regulating the grain warehousing industry in a proper manner, inasmuch as they have never known the average cost of each elevator service at each elevator.** Neither that Board, nor the Canadian Wheat Board (who negotiate handling agreements with the grain warehousing companies) have known the real cost to the companies of providing such services as handling, storing or cleaning at each individual elevator. Consequently, they have not been able to

regulate elevator pricing aimed directly at achieving an efficient, low-cost, elevator system.

Protestations from some of my grain trade friends have not succeeded in swaying me from the belief that **this improper price regulation is the root of the cause of the slow adjustment to change in rural communities.** I could be wrong in proclaiming that the rate of 1/30 of a cent per bushel per day for grain storage is too high. I don't know the average cost of storing grain any better than do the storers of grain themselves. Yet, I am inclined to believe that the average cost to the companies of storing grain in country elevators is not as high as 1/30 of a cent, although it may be tending that way now. Likewise, I feel that the real cost of handling grain at the country elevators is higher than the $3\frac{3}{4}$ cents per bushel currently allowed by Board of Grain Commissioners' regulations. This is particularly true in the many low volume elevators. I am still of the opinion that in one or more ways some internal cross-subsidization is necessary to keep most of the country elevators in operation. I still believe that right here must be the focal point of attack if a reasonable, rational, efficient grain handling system is to be evolved. The spin-off for the affected communities would be significant. The general equilibrium would not be violated.

Price regulation of the grain warehousing industry ought to be such that there is a very minimum of internal cross-subsidization, because then the com-

panies would have to scrutinize their portfolios of elevators even more stringently than they do now. The chances are, I suggest, that chronically unprofitable elevators would be abandoned and a concentration of elevator plant could occur at the points dictated by normal commercial considerations. The number of points shipping an annual volume of over two million bushels would increase. Many of the declining and stagnant communities would likely be phased out. The quality of life for a lot of rural people would be improved.

Improper price regulation of the grain warehousing industry results in the trapping of people in moribund communities where there is no hope of ever improving their lot. This is cruel.

There is a high probability that the Temporary Wheat Reserves Act has been the sneaky devil in this situation. It is possible that the storage rates have remained too high just because the federal treasury masks the carrying costs of wheat with their transfer payments into the Canadian Wheat Board's annual pools under the provisions of this legislation.

The paper issued by the Honourable Otto E. Lang entitled, "Proposals for a Production and Grain Receipts Policy for the Western Grains Industry" has as its very first proposal "that storage payments for wheat under the Temporary Wheat Reserves Act be terminated." **In my opinion, the demise of the Temporary Wheat Reserves Act cannot come too soon.**



In the text explaining this proposal the Honourable Mr. Lang has said that the Temporary Wheat Reserves Act has increased "the relative profitability of wheat in relation to other crops and to some extent has lessened the pressure of normal commercial considerations in assessing the desirability of the use of commercial storage." He went on to add, "Government support for the development of a viable and stable grain industry should not be tied to support for a particular crop and to a particular method of handling it. By taking the proposed action wheat would become less of a preferred crop, easing the pressure to over-produce. Other crops would tend to improve in relative profitability, improving the response of producers to changing market conditions."

The Minister's paper did not explain that with the inauguration of his proposed income maintenance program there would be no need to guarantee prices, and no need to subsidize storage. The present piecemeal approach to government intervention in the grain industry does not make economic sense. It leads to the commission of the economic sin of misallocation of resources, thus generating inefficiency. **I am convinced that the grain handling system in Western Canada is inefficient and I tend to place the blame where I believe it belongs, that is, with the regulatory bodies.** I am satisfied that the commercial interests, who have been the victims of improper regulation, have, by and large, reacted rationally. This is so even for those companies who have left the industry. I cannot escape the feeling that the great decrease in competition in the grain industry at the country level is largely the result of inappropriate regulation.

And I am convinced that this inefficiency has an adverse effect on the people in the communities and that this inefficiency keeps these communities in existence. And so, I look forward to the demise of the Temporary Wheat Reserves Act in the hope that this change will start a chain reaction that includes these links: a rational pricing of elevator services based on the cost of providing each individual service at each elevator; a closing down of chronically unprofitable country elevators; a closing down of those elevators now filled with Wheat Board grain "for storage only"; a phasing out of many declining and stagnant communities; an improvement in the quality of life enjoyed by the residents of the viable communities and the farmers in their hinterlands, and by the people released from the phased out communities.

The community is the important element in social organization, being at once a place of population and

investment concentration and the focus of commerce, service, professional and social activity, and of communication among people. As Professor Marshall McLuhan has told us, "things happen at the interface." Communities offer inter-faces and the possibility of things happening. The larger the community, the greater is the number of events happening; that is not only more but more varied activity.

I hasten to add that I cannot accept what some might judge to be the next logical step; that is, let's all live in the huge cities. The concept applies only to a part of the spectrum. **Somewhere between the Boissevain's and the Tokyo's of this world there is a happy medium. My guess is that it is much closer to Boissevain than it is to Tokyo.** Humans, like other animals, find it difficult to build up a resistance to the evils of crowding. On the other hand, there are evils associated with isolation.

I would remind you that my training has been in economics. Yet, I readily recognize that the changes facing rural people stem in great measure, from the technological revolution and that these changes manifest themselves as pressures that are at least as sociological as economic in nature. The social and psychological factors involved in the process of rural adjustment must also be considered. I would hope that those readers who are familiar with rural sociology as a discipline will make known their views. I can quite understand that economic criteria alone ought not to form the base for policy making.

Because of the objection from people in other disciplines to the concept of "growth centres" I have tried to avoid the words and to think more in terms of opportunities to increase the number of inter-faces. This increase, it seems to me, can best happen in communities where the population is growing and where the presence of these added people and their enterprise generate more activity, in a sort of multiplier effect. The cross-fertilization of ideas, I submit, is of vast importance in improving the welfare of people. And this is not likely to happen in hamlets or in declining or stagnant villages.

One outstanding notion seized me as I looked at the statistics and visited prairie communities, and that is, that so very frequently **the difference between a moribund community and a viable one is that the latter has at least one interested person with ideas and initiative.** These attributes have led to the encouragement of other ideas and activity that, in turn, have led to an improvement of the way of life for people in prairie rural communities. This is one of the significant sociological phenomena noticed by the researchers in the Prairie Regional studies in Economic Geography.

The price of awareness has too often been despair, and prairie people have been acutely aware of impending changes for the past ten years. The threat of external changes being imposed on communities can be disheartening. There is another facet to such situations, however, and here people make the difference. Some face the challenge, others lie down.

Any deviation from the norm arouses an emotional response and often starts the adrenalin flowing. Discussions of impending change tend to be fraught with emotion and the rational decision does not come

easily. Even I find it difficult to adopt the clinical, disinterested approach, to the extent that I am led to believe that poetry rather than the language of the social scientist is more appropriate. For instance, here is a quatrain from *The Rubyat*, on which I shall finish.

*Ah Love! could thou and I with Fate conspire
To grasp this sorry Scheme of Things entire,
Would not we shatter it to bits—and then
Re-mould it nearer to the Heart's Desire!*

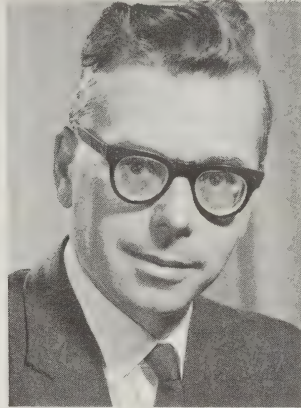
MARKETING FRUIT AND VEGETABLES IN THE 1970's

Retail sales of fruit and vegetables will double during the 1970's.

"[P]roducers will be lucky to maintain 40 percent of retail value of fruit and vegetable sales".

Processed fruit and vegetables fit the retailing plans of large chains — fresh produce does not.

More leisure time and higher incomes will increase demand for convenient foods — at convenient locations.



Geoffrey Hiscocks*

This extremely important subject is not one for quick answers and snappy solutions. Marketing may be the "in" thing at present, but too many people are jumping on the band wagon with the idea that if we just do a marketing study or get into this marketing business all will be well. So a word of warning: "Do not let us forget about production while we think and work on the questions and problems of marketing".

What Do We Mean by Marketing?

When we refer to marketing, we mean any action or activity necessary to prepare an agricultural product in the form, at the place and at the time the consumer wants it. This covers form, time and place. If we elaborate on these three aspects into the detailed features of marketing, then it will include selling, assembly, packing, processing, transporting, storage and promotion. In selling, we must consider prices at various stages—to the producer, in and out of storage, before and after processing, at the warehouse and stores, and prices to consumers. Thus, we refer to a whole range of activities—a very wide range of physical action and facilities, of processes, movements, decisions and systems.

This article is based on a speech given by Dr. G. A. Hiscocks to the 48th Annual Meeting of the Canadian Horticultural Council, Chateau Laurier, Ottawa, February 23, 1970.

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The Demand for Fruit and Vegetables in the 1970's

How shall we look at this complex business and where shall we start? It is generally best to start at the beginning—with production. Let us look at what we need to produce in the 1970's. As far as food is concerned, future demand in Canada will be primarily determined by the future size of the population and the level of income. **A recent estimate of the value of retail sales of fruit and vegetables was about \$800 million and we can expect this to double in the next 10 years.** That is an increase of \$80 million a year. Who will get the biggest share of that extra consumer expenditure? How much will get back to the producer? **On the record of the past, producers will be lucky to maintain 40 percent of retail value.** In another 10 years, it could be as low as 33 or 35 percent or only \$270 million of that added \$800 million of retail sales.

From the opposite side, 60 percent of the consumer's dollar is used in the marketing bill, and **of the extra expenditure of \$800 million we can look for during the next 10 years, \$530 million will go into the marketing process.** This is a lot of money to spend beyond the farm gate.

That is the market demand for 1980, referring only to Canadian demand and not to exports. The total consumer demand for fruit and vegetables will be double the present expenditures at the retail level. The consumer will pay a lot more for a smaller increase in volume partly because of the processes and services wanted with these foods.

How do We Market Fruit and Vegetables Now?

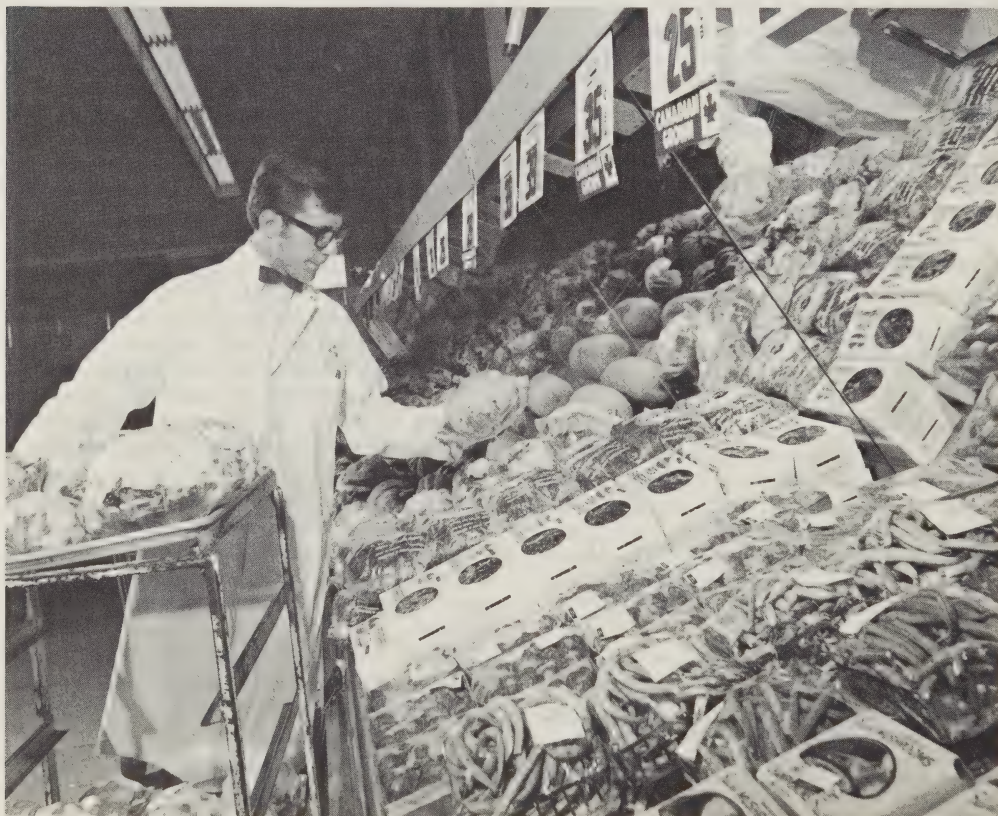
Cash receipts to producers from fruit and vegetables including potatoes in 1969 reached \$245 million. From surveys we have made in Economics Branch about 36 percent of this is marketed in one way or another through a marketing board—\$88 million from the total of \$245 million. In 1957, it was \$40 million or 27 percent of \$147 million. Thus the marketing board share has risen nine percent in twelve years.

In addition to marketing boards, farmer cooperatives have been active in fruit and vegetable marketing. About \$35 million or 14 percent of farmers' receipts from fruit and vegetables are marketed through co-operatives. Many of these are linked with marketing boards and thus there is some duplication in these figures. A more helpful breakdown indicates \$21 million through boards and co-operatives jointly, \$14 million through co-operatives only, \$67 million through boards only. **This is a grand total of \$102**

million or 40 percent of marketings. Thus 60 percent are what many people might call "free". This covers many different ways of marketing through grower-shippers, dealers, wholesalers, food terminals and even vertically integrated processor-growers, and retail-wholesale-growers. These other mechanisms and procedures and firms are clearly important in fruit and vegetable marketing.

Before we get to the consumer level there are two other sectors of increasing significance. The first is processing where a large proportion of produce is directed before consumption and where we can expect larger increases in consumption than are likely for fresh produce. This will be particularly true as the demand for convenience foods rises still further.

Some of this volume will pass through wholesalers, some is channelled directly to plants through producer co-operatives, through marketing boards, through producer-dealers, or directly by producers. But the operation of the wholesale merchant has become very considerable and significant in Cana-



dian food (and also of course in non-food) distributing and selling. Some of these are quite independent in operations and ownership, but others are closely controlled by other parts of the food business. The majority of these connections are with the retail chain system. Nevertheless, we must not overlook the role and function of the wholesale merchant. There is a job to be done here and some group has to perform it.

What about the retail aspect of selling fruit and vegetables—fresh or processed? Our marketing system has dominant retail organizations with extensive horizontal operations of either many stores under the one name and management, or several groups with central management and increasing vertical integration. These types of management have tremendous impact on processing and assembling and on private labels, loss leaders, promotions and consumer buying habits.

The dominant organization systems at the retail level are the corporate chains and the voluntary group chains. These two have only about 6,000 stores, but 70 percent of the sales volume. The modern large supermarket now stocks 10,000 items compared with the 3,500 a large food outlet would have carried only 20 years ago. The independents are large in number, around 25,000, but with only 30 percent of sales. Even more significant has been the trend in the last few years where by the large corporate chains have had difficulties in further increasing their share of sales from the independents which are mostly the corner stores. Thus, we now find springing up new chains of corner stores—stores that sell a high volume of fewer items than the 8 to 10,000 which supermarkets are forced to keep on the shelves.

To operate a large chain of supermarkets with a high number of shelf items requires a central organization to supply large volumes of similar quality produce on

a regular basis. The produce must be readily available to deliver to a large number of different locations. Processed fruit and vegetables fit well into this kind of operation; either canned or frozen, they can be stored and moved easily. Fresh fruit and vegetables do not fit well. They are often not available on a regular basis or in sufficient volume to fulfill the needs of the supermarket chain. The alternative is to call a broker who can readily provide carlots from the United States—any quantity, at almost any time of the year.

Of increasing importance for fruit and vegetables are the roadside stands, catering to travellers and vacationers. Similarly the open markets, street markets, truck markets where growers bring their produce to sell directly to retailers or the public. In both cases, fresh produce is provided for close inspection but many of the steps in the marketing system are eliminated or performed by the producer and his family. The producer takes a higher share of the consumer's dollar but has higher costs to bear and longer hours to work.

What Is Going on in this Marketing Process?

First, the produce is brought from the producer and assembled. This could be at the farm, through a co-operative, under a marketing board or at a food terminal market. Then it is delivered either to a processor's plant where it is frozen, cooked, crushed or "somethinged" to ready it for further use. The produce could be canned, frozen, souped, juiced, stored or even prepared into a complete meal.

If it is to move to consumption soon, then it will most surely be cleaned, graded, packaged, labelled and assembled in volume. This could be the dealer or the wholesaler who will already have sold volumes



for various outlets—some for restaurants and hospitals and the large quantity for a supermarket chain and smaller quantities for suppliers of the corner stores. There will probably be some advertising cost also. The produce could have moved only five or 10 miles from the farm to the factory or the local store or several thousand miles through packing-houses, storage, wholesaler or directly to the big retail store.

In total this is complex and expensive, and it will expand and change in the future. It will change and these changes can be determined by and be made to benefit those closely involved in it, especially the most numerous—the producers—or it can be left to the most dominant group in the marketing system—the corporate retail organization. That is the way it will go by default.

How Will Marketing Change in the Future?

One feature that became important in the 1960's and will be even more so in the 1970's is the demand for food and especially for fruit and vegetables. Let us look for a moment at the trend in the habits of the Canadian people. **By far, the most important development has been the increase in eating away from home. The keys to this trend are travel and recreation.** Canadians traditionally have been travellers but the next ten years will see vacation movements on an unprecedented scale. This will involve:

- (1) more summer cottages;
- (2) more travel within Canada by trailer, camper, boat or the new word, "recreation vehicle", and in the winter by ski and snowmobile;
- (3) more visitors to Canada and more travel outside Canada;
- (4) more eating at restaurants, picnics, cafeterias, schools and clubs.

This could mean that the housewife will prepare fewer meals in the home and definitely less will be eaten in the family house or apartment. But the family will buy just as much food and most likely pay more for it. As we travel to and from our summer cottages, we want different food. We want fresh food ready to eat or processed food that can be easily and quickly served. We want to buy food in different places. In the 1970's, we will have more time to choose and select than on the usual Friday night rush through the supermarket, or the quick trot to the corner store for that forgotten item. This greater travel and outdoor living away from home could encourage a greater use of the smaller towns and centers on weekends and in vacation periods. It could call for more use of the local markets in cities and towns as people quest for fresh produce to take on their journeys.

At the same time more meals will be bought in restaurants, hotels and cafeterias across Canada. One trend has been the increase in food purchases from machines. In addition to the standard hot and cold drink machines, there are some surprisingly good automatic dispensers of fruit and fruit juices.

Our society develops these trends because we have less time to spare at some times, and we do more eating and living outside because we have more money and more vacation time. These somewhat conflicting trends will have an important influence on our food buying habits and naturally will affect our marketing choices and will call for changes to be made.

How Will Marketing Take Place in the Future?

We can look forward to the corporate retail chain to become more dominant and to have larger outlets. The corner store or the convenience store will continue, but mainly as a subsidiary part of a large retail chain. The independent store's managerial requirements are different, but in terms of market penetration, its role is significant, and it offers a wider market for brand names and private labels, and thus for production and advertising returns.

We can expect the institutional trade—hotel, restaurant, franchisee and hospital—to increase at a rapid rate. Here, the big trend has been for the franchised food outlets with the plan for a uniform-quality supply of a few significant food items on a restricted menu, with regularity of supply and steady price important elements.

The 1970's will bring increased demands in the more specialized vacation areas. Some areas have tremendous potential; particularly, the Maritimes, especially Nova Scotia and Prince Edward Island, and the Ontario lakes and the St. Lawrence River areas, lower British Columbia and many others. Some of these areas will be close to the traditional cities and thus the regular markets, but others will not and will require planning to re-direct food away from the cities into the vacation areas. This will not just be for the summertime. The snowmobile has now opened up new vistas of the beauty of winterland. People are travelling to areas previously closed in the winter and rural gas stations, restaurants, general stores find a new demand for food and meals.

These are a few thoughts and projections on the time and place and form of foods during the next ten years. What about the mechanics and machinery? We all know this is the age of the computer but its impact is only just beginning to be felt in the task

of food marketing. The big vertically integrated retail organizations have based their merchandising programs on computerized information but the routine tasks of selling and pricing and assembling are only just coming under the discipline, economy and re-organization that is possible with computers. Nevertheless, this will occur and changes will take place. Methods will be different as more advanced procedures are developed. The key elements for the supermarket operator are large volume of turn-over at a low margin to maintain a return in investment. Prices have to be low to keep the volume high.

Looking at all these trends, fruit and vegetable marketing must take into account three important facts.

- (1) much higher volumes of consistently high quality produce for the general retail business and the institutional trade;
- (2) high quality fresh produce for vacationers—in vacation areas;
- (3) while there will still be many opportunities for export and initiatives will expand in some areas, there will be greater opportunities within Canada than outside.

Marketing is going to change in the future. The golden opportunity is now in the hands of Canadian growers and their organizations. They must take the initiative and develop policies for the future. The alternative is to let others change marketing policy. Commodity groups, geographical groups and high volume suppliers would be glad to change policy to meet their own interests.

How Can We Proceed?

Let us look at the possibilities for the future. First, we need more and regular information on the opportunities. Second, we need to look at existing organizations:

- (a) Co-operatives.
 - (b) Marketing Boards.
 - (c) Commissions for Marketing.
 - (d) National Marketing Boards
- and finally at the total marketing costs and ways to become more efficient in the marketing task.

The first step is to constantly seek better information on markets, volumes, qualities and prices. We must gather and present more market outlook material to guide not only producers but also the market mechanism and all the organizations that are part of it—from initial buyers to final consumers.

For the 1970's, I suggest we need a joint operation in

the task of improving our continual flow of information—I would like to suggest that we work together on a Federal and Provincial basis together with producers, wholesalers and processors and that the Horticultural Council is ideally set up to provide the co-ordinating forum and link and machinery. It is far too complex and expensive for each to go off and do this on our own.

What do we do with this greater flow of information? We use it in our marketing and merchandising operations. Are we going to let the increased demands for fruit and vegetables in the 1970's just happen, or are we going to take positive steps to make better use of this opportunity? If we look at the alternatives, the first is to do nothing and suffer the consequences.

The second is to take a good hard look at the producer co-operatives in fruit and vegetables. We assembled some information on this subject in the Economics Branch as the co-operatives' share of farm cash receipts for fruit and vegetables by province. It seems that only at either end of this great country are we co-operatively minded, but in the middle each goes his own way. Only British Columbia and Nova Scotia reach 40 to 50 percent of cash receipts by co-operatives. Whatever the reason, here is a vast opportunity that should at least be considered. Only five percent of fruit and vegetables are marketed by co-operatives that do not also include marketing board operations. Possibly this last aspect is important. But why are these operations of co-operatives so confined? Is there no scope for regional links to strengthen volume, coverage and organization? The co-operative movement of the United States has recently made some big strides in developing very strong producer co-operatives on a regional basis.

In the area of marketing boards, there have been many developments over the past few years. Ten years ago we had only a dozen marketing boards in the area of fruit and vegetables. Now there are more than 20, and the value of the products handled by these boards (including Commissions) has risen from about \$40 million in 1957 to \$88 million in 1969. That is a rise of 120 percent. Is there scope for more marketing board activity? If producers want to organize their own marketing, if they want to get more involved in what happens to their produce, and to have more control over prices and costs in marketing; then, there is more scope.

Some producers have developed the Commission concept, which brings all those involved in marketing together to develop systems to improve the marketing mechanism. This too, provides alternative means and valuable opportunities.

Very few marketing boards are really active outside their own province, and too few work with other boards for a united purpose. Yet, there are many opportunities in the marketing sphere. In addition, the Minister of Agriculture has announced that legislation will be introduced that will provide opportunities for the establishment of national marketing boards. Here is another alternative that needs to be considered carefully and without delay, if producers are to grasp opportunities due to increases in demand and, changes in marketing, and to obtain the maximum benefit from them.

Whatever mechanism we consider and use, the real issue is: Does it do the job efficiently? If we set up new boards, it is ridiculous just to add another procedure. It will just cost money, most likely producers' money, and may not raise the total receipts by as much as the total cost. Improvements and benefits of marketing whether they are storage, transportation, pricing, promotion or bargaining must ensure that the costs incurred (levies, checkoffs, etc.) are repaid with savings elsewhere and that higher prices negotiated do not reduce volumes sold. Price times volume equals income. **In the modern world, low prices and high volumes bring the best net incomes—and generally the lowest costs.**

The purpose of the marketing mechanism is to get the fruit and vegetable products in the form, at the time and in the place the consumer wants. It is no good producing and then expecting to market what you have and get the best price at the least cost. The objective should be to get the best possible price to the producers, proper returns to the rest of the marketing system while doing the whole job at the least possible cost. The producer should aim to maximize his share of the consumer dollar while the other elements in the marketing system are paid a fee to perform their function. To improve the market-

ing system we have to look thoroughly at all parts and see that the job each is doing is necessary and that it is done efficiently. Marketing costs can only be lowered by eliminating steps, increasing volume or using more modern techniques which are cheaper.

Potentially, Canada is a big market for fruit and vegetables and is made up of a series of segments, co-ordinated on a national basis. It is no longer satisfactory to do the job area by area or province by province. There are good alternative supplies of fruit and vegetables to the south and there are good alternative sources overseas. There are many parts of the marketing system which will not change on their own. If each producer decides to do the job on his own, then each group or each commodity may try for a bigger share of the Canadian market dollar. Some will achieve it, some will not. If producers work together at the total job of marketing—from producing what the consumer wants (or is persuaded to want) to packaging or processing in the form he wants and making sure it's in the place where he wants it—efficiently, then producers are totally involved in marketing and can get a bigger share of the domestic market for Canadian producers. Also Canadian processors will be well down the road to a bigger export market.

This has been a very brief introduction to horticultural marketing—a tremendous subject. The whole question of marketing boards and the forthcoming Federal legislation is itself a big field. In conclusion, therefore, it must be remembered that good marketing begins with good planning. Good planning means both production planning and marketing planning. To plan effective marketing strategy and mechanisms, we need a sound foundation of information. Only with solid information, can we tackle the problems of the future and take advantage of future opportunities.

THE MARKET OUTLOOK FOR MARITIME POTATOES

The market of the 1970's will likely show a continuation of the trends established during the 1960's.

"[T]he drop in per capita use of table stock has been largely offset by the rise in the use of processed potatoes products".

"[P]roduction has increased most rapidly in the West".

"[C]ustomers are willing and able to pay more for better quality potatoes".

"[I]t seems more likely that we will have marketing boards rather than freer international trade".



*Don Kidd**

The changes that will likely affect the markets for Maritime potatoes during the 1970's are likely to be a continuation of the trends established during the 1960's. To be prepared for future developments, we should understand what has been happening in the potato industries and food markets of Canada and the United States during the past decade. In addition, there are bound to be some unexpected developments.

The markets for Maritime potatoes are complex in that they consist of actual and potential customers for table, seed and processing potatoes; and these customers are spread over a large portion of the world. It is also important to realize that all markets consist basically of customers, producers and middlemen. What changes are occurring among the customers for Maritime potatoes?

Consumer Demand

On the demand side, the number of potential customers for Maritime potatoes has been growing at a steady rate. In Eastern Canada, the population rose to 15.7 million in January 1971, up by 2.5 million from a decade earlier. Similar growth in population has occurred in the United States and in other countries that are markets for Maritime potatoes.

This article is based on a speech given to potato industry people on December 7, 1970 at Fredericton, N.B.

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Most customers for table stock and processed potato products have experienced rising levels of real income. Per capita disposable income in Canada reached \$2,450 in 1970, up by 63 percent from the level of \$1,500 in 1960. As a result, more families are willing and able to purchase more convenience foods, such as frozen French fries, instant mashed, chips, etc. Besides these household convenience foods that are bought in the supermarket, there are many new food service business that cater to 'drive-in' and 'take-out' customers. French fries are a popular food item among fast food suppliers.

The consumer markets of North America are also characterized by a growing proliferation of products and services. Whole table potatoes are not only in competition with commercially processed French fries and flakes, but with instant rice, spaghetti, and macaroni. Most of these products are processed and promoted by large food manufacturers. In addition, Maritime potatoes have to compete with other products such as specially sorted and packed baking potatoes from Idaho, Washington and other producing areas of the continent.

As a result of the development of alternative or substitute food products for whole potatoes, per capita consumption of table stock potatoes in Eastern Canada has declined sharply during the past decade (Table 1). However, the drop in per capita use of table stock has been largely offset by a rise in the use of processed potato products.

The Eastern Canadian public consumes more potatoes and potato products than does the population

TABLE 1—POTATOES: PER CAPITA PRODUCTION, TABLE USE AND PROCESSING OF POTATOES IN EASTERN CANADA, CROP YEARS 1956-57 TO 1969-70 AND FORECAST 1970-71.

	Unit	Average 1956-57 1960-61	Average 1961-62 1965-66	1967-68	1968-69	1969-70	1970-71
Population at January 1.....	millions	12.7	14.1	15.1	15.3	15.5	15.7
Per Capita Production.....	lbs.	274	273	253	286	263	259 ^a
Per Capita Table Use.....	lbs.	177	154	134	144	129	123 ^a
Per Capita Processed.....	lbs.	17	30	47	47	51	53 ^a

^aForecast.

TABLE 2—POTATOES: PRODUCTION, IMPORTS, EXPORTS AND UTILIZATION IN EASTERN CANADA, CROP YEARS 1956-57 TO 1969-70 AND FORECAST 1970-71.

	Average 1956-57 1960-61	Average 1961-62 1965-66	1967-68	1968-69	1969-70	1970-71 ^a
million cwt.						
Production.....	34.7	38.5	38.2	43.8	40.8	40.7
Imports.....	1.3	1.0	1.2	1.0	1.1	1.0
Total Supply.....	36.0	39.5	39.4	44.8	41.9	41.7
Exports.....	2.6	3.8	2.4	4.2	4.1	4.0
Use for seed in Eastern Canada.....	3.0	2.8	3.2	3.1	3.1	3.1
Use for starch, feed, shrink and waste.....	5.8	6.9	6.5	8.2	6.7	7.0
Use for table in Eastern Canada.....	22.5	21.8	20.2	22.1	20.1	19.3
Processed in Eastern Canada.....	2.1	4.2	7.1	7.2	7.9	8.3
Total Utilization.....	36.0	39.5	39.4	44.8	41.9	41.7

^aPreliminary and Forecast.

of any other comparable region in North America. Although I regret that potato statistics in Canada are not as comprehensive and reliable as they need to be, my estimates of per capita use of table stock in Eastern Canada show a steady drop to a record low estimate of 123 pounds per capita in the 1970-71 crop year from a high of 177 pounds per capita during the 1956 to 1961 period.

Processed Products

The drop of about 50 pounds in the per capita use of table stock in Eastern Canada during the 1960's was almost offset by a sharp rise in the volume of potatoes that were plant processed into French fries, chips, flakes and other products during that period. Because statistics on the volume of potatoes used for processing in Eastern Canada are poor, we used rough estimates that show that the volume of processing has quadrupled from 2.1 million cwt. during the late 1950's to a probable volume of 8.3 million cwt. in the current crop year (Table 2). On a per capita basis (Table 1), the volume of processing has about tripled from 17 to 53 pounds over the past decade;

though a minor portion (5 to 6 pounds) of the per capita output of finished product was exported. Besides the volume of plant processing, many potatoes in Eastern Canada, particularly in the large urban centres, are prepared (peeled, sliced) for the restaurant trade by smaller operators whose volumes are not included in our processing estimates.

Similar trends in the per capita consumption of table stock and processed products have occurred in the United States, where about 45 to 50 percent of potato consumption occurs in the form of processed products. Total per capita consumption in the United States is however only about 110 to 115 pounds on a fresh equivalent. There the growth of processing has checked the downward trend in total per capita potato consumption that had been occurring. Studies of the patterns of food spending by United States families show a marked increase in the purchase of processed potato products among middle income families as compared with low income families. A similar situation likely exists in Canada.

Since family income levels are lower in Eastern Canada than in the United States, it will be more

difficult to expand sales of processed potato products in Eastern Canada to the American level of 50 percent of sales. Canadian food shoppers appear to be more price conscious than their U.S. counterparts. In Canada, the relatively high cost of processed potato products will appeal to only those shoppers who want a "built-in maid service" with their product. The trend toward processed products in Eastern Canada will likely continue, expanding proportionally to the growth of disposable family incomes in the 1970's.

What are the other implications for potato marketing of more affluence among Eastern Canadian families? More Canadians of the future will likely reside in multiple unit dwellings in large urban centres and they will have fewer children. More wives will work outside the home. Most shoppers will purchase their produce in food supermarkets that emphasize self service. Then, small packages of clean, bright, uniform, sound tubers will likely appeal most to both shoppers and retailers. Open window, mesh and poly bags will become more popular. These developments, as they occur, will necessitate some changes in the production and marketing of Maritime potatoes.

Export Markets

In spite of the much larger size of the domestic demand than of the export demand for Maritime potatoes, the export markets are more important in some respects. **The general level of potato prices on this continent is determined, to a large extent, by the volume of potato production in North America.** Except for the tariff on potatoes between Canada and the United States, potatoes from several important producing regions are shipped freely to urban markets, throughout the continent. Potatoes from several shipping districts compete for sales among customers in New York, Boston, Montreal, Toronto and other cities.

The offshore export markets in the Caribbean, South America and the Mediterranean Regions have been especially important, over the years, to the Maritime potato industry. During the past year, additional export shipments to Chile, Venezuela, Trinidad and to Greece was one of the main factors in the price recovery from the depressed level of the previous years. The prospects for offshore exports for the coming crop are not as bright as a year ago, but that factor according to preliminary estimates is offset somewhat by slightly reduced production in Eastern Canada.

The natural variation in the size of the potato crops in any particular year and in any region of the world requires that potato producers have free

access to the broadest possible geographical range of markets. Otherwise, there are likely to be problems with surpluses and low prices in years of favourable weather. The potato industry has experienced such difficulties in the past, and these problems have not been solved as yet. What is the best solution to the problem of surpluses and low prices? Is it free trade with the U.S. and other countries? Is it better marketing? Is there a role for producer marketing boards, or for a potato industry council?

Trends in Production

The extent of potato production in the Maritimes in the past ten years compared with production in other parts of Canada and the United States during the same period is shown below in Tables 3 and 4. They show that potato production in the Maritimes during the past 10 years averaged about seven percent of total production in North America in those years. Also, production of potatoes in Canada and the United States in 1970 was up by 15 and 19 percent respectively from average output during the 1961-65 period. In both countries, **production has increased most rapidly in the West: Idaho, Washington, Oregon, California, Alberta and Manitoba.** Production in the Maritimes rose by about 25 percent from the 1961-65 average until 1966, and had declined slightly since that time. For the most part, production trends have been level in Central Canada, in the Eastern and Central United States, except for some expansion in the Red River Valley of North Dakota and Minnesota.

Canada—United States Trade

Because of the regional and seasonal distribution of potato production on this continent, trade in potatoes between Canada and the United States has been a two way deal for many years. However, both the volume and value of our potato imports from the United States have generally exceeded the volume and value of exports to that country (Table 5).

The Maritimes account for the bulk of Canadian potato exports to the United States, which consist of about 60 percent seed stock and 40 percent table stock. On the other hand, American exports to Canada originate mostly in Florida, California, Virginia, Washington and are shipped to markets in Central and Western Canada. Imports are predominantly for table stock, but chip stock comprises a large proportion of total imports; seed stock imports are relatively unimportant.

While both countries benefit from trade in potatoes, as they do from the exchange of other products, **Maritime potato exports to the United States and**

TABLE 3—POTATO PRODUCTION IN THE MARITIMES, EASTERN AND WESTERN CANADA, 1956 TO 1970

Province or Region	Average 1956-60	Average 1961-65	1966	1967	1968	1969	1970
million cwt.							
New Brunswick.....	8	11	14	12	14	13	11
Prince Edward Island.....	7	8	11	10	11	11	10
Total Maritimes ^a	17	20	26	23	25	25	22
Quebec.....	10	9	9	8	10	8	8
Ontario.....	8	10	10	7	9	8	10
Eastern Canada.....	35	39	45	38	44	41	40
Western Canada.....	6	7	10	9	9	11	13
CANADA.....	41	46	55	47	53	52	53

^aIncludes Nova Scotia.

TABLE 4—POTATO PRODUCTION IN THE UNITED STATES, BY SEASONS, WITH THE FALL CROP BY REGIONS, 1961 TO 1970

Season and Region	Average 1961-65	1966	1967	1969	1969	1970
million cwt.						
Early Summer.....	13	14	14	14	14	12
Late Summer.....	30	29	29	30	29	30
Total Summer Crop.....	43	43	43	44	43	42
Fall Crop —						
Eastern States.....	66	65	67	64	62	63
Central States.....	47	48	49	50	51	52
Western States.....	86	115	115	107	125	137
Total Fall Crop.....	199	228	231	221	238	252
Total Winter and Spring ^a	32	32	29	32	29	29 ^b
Total Production.....	274	303	303	296	310	323

^aFor Winter and Spring, 1962-66 average and 1967-71.

^bForecast.

TABLE 5—CANADIAN EXPORTS AND IMPORTS OF POTATOES TO AND FROM THE UNITED STATES, 1963-64 TO 1969-70^a

	Exports			Imports		
	Table	Seed	Total	Table	Seed	Total
million cwt.						
1963-64.....	0.4	0.8	1.2	1.6	0.1	1.7
1964-65.....	1.3	1.3	2.6	1.3	—	1.3
1965-66.....	0.2	0.8	1.0	2.2	0.1	2.3
1966-67.....	0.8	1.3	2.1	1.7	0.1	1.8
1967-68.....	0.2	0.5	0.7	2.4	0.1	2.5
1968-69.....	0.8	1.1	1.9	2.1	0.1	2.2
1969-70.....	0.5	0.7	1.2	2.1	0.1	2.2

^aCrop year basis.

Puerto Rico are handicapped by a table stock quota of 45 million pounds and a seed stock quota of 114 million pounds, which when filled, doubles the normal rate of duty from 37½ cents to 75 cents per cwt. The Canadian duty on United States potatoes is a straight 37½ cents per cwt. without limit as to quota.

The volume of Canadian potato exports to the United States, Puerto Rico and other countries for the past seven years is shown for table stock in Table 6 and for seed stock in Table 7. Canadian potato exports to the United States and Puerto Rico in the seven years since 1963 have exceeded the table stock

TABLE 6—TABLE POTATO EXPORTS, CANADA, 1963-64 TO 1969-70^a

Country	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
million cwt.							
United States.....	0.4	1.3	0.2	0.8	0.2	0.8	0.5
Puerto Rico.....	0.3	0.7	0.1	0.5	0.2	0.5	0.2
Sub Total.....	0.7	2.0	0.3	1.3	0.4	1.3	0.7
Others.....	0.5	0.2	0.5	0.4	0.1	0.3	0.4
Total.....	1.2	2.2	0.8	1.7	0.5	1.6	1.1

^aCrop year basis.TABLE 7—SEED POTATO EXPORTS, CANADA, 1963-64 TO 1969-70^a

Country	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
million cwt.							
United States.....	0.7	1.3	0.8	1.3	0.5	1.0	0.7
Puerto Rico.....	—	—	—	0.2	0.3	0.4	0.3
Sub Total.....	0.7	1.3	0.8	1.5	0.8	1.4	1.0
Cuba.....	0.3	0.3	0.3	0.3	0.3	0.3	0.4
Venezuela.....	0.3	0.2	0.2	0.3	0.3	0.2	0.4
Argentina.....	0.2	0.2	0.1	0.3	0.1	0.2	0.2
Uruguay.....	0.4	0.3	0.2	0.1	0.1	0.1	0.1
Greece.....	0.2	0.2	0.2	0.2	0.1	0.2	0.3
Italy.....	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Others.....	—	0.1	0.1	0.2	0.1	0.2	0.6
Sub Total.....	1.5	1.4	1.2	1.5	1.1	1.3	2.1
Total.....	2.2	2.7	2.0	3.0	1.9	2.7	3.1

^aCrop year basis.

quota in five years and the seed stock quota in three years.

Potato Prices

The effects of the Canada—United States potato tariff upon price levels for potatoes in both countries is shown in Tables 8 and 9. Average returns to potato

producers in New Brunswick have been considerably less than average returns to producers in Maine. Similarly, growers in New York and Michigan have done much better, price-wise, than have growers in Quebec and Ontario. On the other hand, potato growers in Western Canada have received average prices that were considerably above the level of returns in North Dakota, Idaho and Washington.

TABLE 8—POTATO PRICES TO PRODUCERS IN MAIN PRODUCING AREAS, CANADA AND U.S., 1965 TO 1969

Area	1965	1966	1967	1968	1969
dollars per cwt.					
New Brunswick.....	2.20	1.05	1.31	1.05	1.63
Prince Edward Island.....	2.55	1.09	1.37	1.15	1.68
Maine.....	2.36	1.70	1.36	1.85	2.20
Quebec.....	2.46	1.72	2.05	1.95	1.80
New York, upstate.....	2.80	2.78	2.29	2.71	3.30
Ontario.....	2.85	1.56	1.95	1.98	2.77
Michigan.....	2.47	2.36	1.87	2.20	2.60
Manitoba.....	2.70	1.60	1.94	1.86	1.92
North Dakota.....	1.40	1.60	1.34	1.35	1.61
Alberta.....	2.85	2.45	3.05	2.40	2.60
Idaho.....	1.93	1.67	1.61	2.35	2.02
British Columbia.....	3.40	3.00	3.30	3.11	3.18
Washington.....	1.55	1.70	1.44	1.71	1.55

^aPreliminary — August to January inclusive for Canada.

TABLE 9—POTATO PRICES AT SHIPPING POINTS IN NEW BRUNSWICK AND MAINE IN 50 LBS. PLAIN PAPER BAGS^a, BY MONTHS, 1966-67 TO 1969-70

	1966-67		1967-68		1968-69		1969-70	
	N.B.	Maine	N.B.	Maine	N.B.	Maine	N.B.	Maine
cents per bag, f.o.b. shipping point								
October.....	83	118	90	—	—	—	—	105
November.....	84	118	83	82	75	98	87	97
December.....	78	118	75	71	72	93	92	96
January.....	78	124	83	66	75	94	123	130
February.....	69	104	74	55	72	94	122	129
March.....	59	85	70	54	65	100	119	146
April.....	46	64	67	76	59	91	128	139
May.....	54	88	91	107	73	100	171	163

^aCanada No. 1 and U.S. No. 1 Round Whites, mostly Katahdins.

The relationships between monthly shipping point prices in New Brunswick and Maine during the past four marketing years are shown in Table 9. In most months, since the fall of 1966, prices in New Brunswick were below comparable prices in Maine, and on these occasions the Maritime shippers were exporting to the United States. The effect of this export volume to the United States was to maintain the price structure in New Brunswick at the equivalent of the Maine price level. In other words, the Maritime producers' prices were on an export basis. The 1967-68 marketing year was an exception to this general situation because supplies were down relatively in Eastern Canada, but were very heavy in the United States in that year. (Tables 3 and 4).

Effects of Reduced Tariffs

What will happen to the potato tariff arrangement between Canada and the United States is impossible to predict. **The Task Force on Agriculture recommended that free trade in potatoes should be a policy objective of the Canadian potato industry.** Even so, some industry people, especially in Western Canada, would be satisfied with equalization, that is, elimination of the United States quota.

Freer trade in potatoes would have a mixed effect upon potato price levels in Canada. In the Maritimes and in Central Canada, potato prices would be higher whenever supplies are in excess of domestic requirements, which is the usual situation from August until the following May. It is becoming more evident among early potato growers in southwestern Ontario and among chip stock producers in Central Canada that freer access to United States markets would be more advantageous than present arrangements.

Elimination of the duty on potato imports into Canada from the United States would likely reduce new

potato prices in Central Canada during the spring, when Canadian supplies of new potatoes are non-existent. In Western Canada, potato prices would likely drop by the extent of the duty of 37½ cents per cwt. as a result of the lower cost of imports from the Western States.

It is quite obvious that the present quota arrangements under the United States tariff are an obstacle to the further development of table stock markets in that country. In order to minimize the adverse effects of the duty, it is necessary to produce and ship varieties and packs of higher than average value, that is, Netted Gems, Mountains or certified Katahdins. This has been a feature of Maritime table stock shipments to the United States in recent years.

Marketing Organization

The Task Force on Agriculture also maintained that the marketing of Maritime potatoes has been badly handled. They recommended that producer marketing boards be organized in New Brunswick and in Prince Edward Island in order to improve producer prices and marketing conditions.

Because of the competitive producing and shipping situation in Eastern Canada, I believe that a marketing board in any one province would be unable to improve potato prices. A board or commission could however, undertake programs to improve product quality and promotion. A regional marketing board would appear to be necessary to improve prices throughout Eastern Canada. Although this would be difficult to arrange among producers in Eastern Canada, federal marketing legislation (Bill C-176) is pending to provide the legal framework according to producers' expressed wishes.

The consequences of controlled marketing upon the volume of Maritime export trade in potatoes with

the United States and other countries could lead to a decline in exports as a result of higher prices. Not many countries, especially the United States, will accept the dumped products of surplus producing countries having two price systems. Besides, potato imports from the United States would continue to be available to terminal market distributors in Canada, and imports would set a ceiling on potato prices in Eastern Canada.

Because Eastern Canada, and especially the Maritimes, are net exporters of potatoes, marketing controls on potatoes could quickly result in a general need for a cutback in acreage and a production control system. In this regard, production controls for potatoes proved unsuccessful in the U.S. in the 1940's. Owing to the disadvantages of regulated marketing, the alternative of freer international trade in potatoes under an open competitive system would eventually return greater benefits to the Maritime potato producer than would a system of comprehensive marketing controls. **However, at this time, it seems more likely that we will have marketing boards rather than freer international trade.**

Market Planning

It is just as important under the competitive system of marketing as under regulated marketing, that good plans and programs be developed for marketing the crop. Some of the planning requirements can be most effective if undertaken on an industry basis,

while other aspects must be left to the initiative of individual growers and shippers. Matters of joint industry concern are for example: (1) some aspects of the role of public transportation, such as the freight rate structure, adequacy of equipment and services, (2) the future role of the seed certification program, (3) the administration of the produce licensing regulations, grade standards, inspection and market reporting by the Fruit and Vegetable Division, (4) the role of an industry financed promotion program for potatoes and (5) the operation of a surplus diversion program for potatoes. **Even without becoming directly involved in marketing potatoes, it appears there is a need for an organization, such as the proposed Potato Industry Council, to deal effectively with matters and problems that are of concern to the entire industry.**

Product Quality is the Key

For the individual grower, effective marketing of his crop starts back with the production planning phase. It includes the selection of varieties, class of seed stocks, and management practices for production, harvesting and storage. All these aspects should be oriented toward the production and marketing of high quality potatoes.

Although the markets for potatoes will likely remain extremely competitive, **there appear to be profitable opportunities for those producers and shippers who pay attention to market requirements, which are**





becoming generally more specialized. The average prices to producers for seed and table stock (Table 10) indicate the price and income advantage for producers, of having their crop certified for seed. Also, marketable yields of seed are 90 to 95 percent as against 70 to 75 percent of table stock production.

Most users of potatoes are willing and able to pay a fair price for potatoes that meet their requirements. There are specialized markets, such as (1) the high class restaurant demand for count boxes of sized

bakers (2) the ordinary restaurant demand for large sized peelers and (3) among chip (confectionery) manufacturers, that normally pay an attractive premium over the prices of No. 1 Canada table stock.

Another fact of the retail markets for table stock in North America is that potatoes sell in a very wide range of prices, as high as **\$1.29 for Idaho No. 1 Russet Burbanks in 10 pound bags in Chicago** and as low as **19 cents for a 10 pound bag of Canada No. 1 Round Whites in Central Canada**. There are many potential customers for better quality potatoes in

TABLE 10—POTATO PRICES TO GROWERS: CERTIFIED SEED, FOUNDATION SEED, AND CANADA NO. 1 TABLE STOCK, NEW BRUNSWICK, 1965-66 TO 1969-70

	Foundation	Certified	Canada No. 1's Round Whites	Netted Gems
dollars per barrel, bulk basis				
1965-66	4.80	3.90	3.55	—
1966-67	3.51	2.86	1.55	—
1967-68	2.78	2.68	2.06	—
1968-69	2.99	2.51	1.65	3.00
1969-70	3.52	3.13	3.37	3.53

Eastern Canada, and their number is increasing, but so is competition among various food suppliers for their patronage.

Outlook for 1970-71

The outlook for the current year illustrates all the difficulties and problems that have plagued the industry in recent years. There is another large increase of production in the Western United States, but production in the Eastern and Central States is about the same as a year ago (Tables 3 and 4). In Canada, production was up sharply in Ontario and to a lesser extent in Quebec. As a result, sales of Maritime potatoes to Central Canada in the fall period of 1970 were below year ago levels. In addition, offshore demands are also lower because of a return to

normal production in South America and in Western Europe. On the basis of past experience with total supplies and utilization in Eastern Canada, it will be difficult to restore an adequate price level for Maritime potatoes because of the apparent need to export about 4 millions cwt. again this year (Table 2).

SUMMARY

In this paper, I attempted to discuss the most basic facts with respect to the marketing of Maritime potatoes. Generally, the industry faces the challenge of either being able to expand effective demands, or the prospect of incurring low prices and losses until more producers are forced to quit production. The growth of the processing sector will expand the demand for processing potatoes, but the outlook for table stock is less favourable. High tariffs and quotas in the United States will retard sales of table stock to that country, especially so if American production continues to expand as rapidly in the 1970's as in recent years. It appears likely that the demand for table stock in Eastern Canada will continue to decline, although customers are willing and able to pay more for better quality potatoes. Because of continuing economic difficulties, it appears necessary that some form of industry organization should be developed in order to press for policies and to undertake programs that will promote the progress and prosperity of the Maritimes potato industry.

POLICY AND PROGRAM DEVELOPMENTS

Agricultural Products Board Act (British Columbia Apple Concentrate)

The Agricultural Products Board has been authorized to purchase up to 130,000 gallons of British Columbia apple concentrate, according to specifications established by the Board. The federal government has also authorized the Board to incur a loss relating to the above purchase and sale operations to a maximum of \$400,000 (February 11, 1971.)

Agricultural Products Board Act (Broilers and broiler parts)

The Agricultural Products Board has been authorized to purchase up to three million pounds of broilers and/or broiler parts according to specifications established by the Board, at a price not exceeding 30 cents per pound for broiler (with an appropriate differential for parts). The Board is also authorized to sell and ship broilers to approved destinations, at a price not less than 16 cents per pound (with an appropriate differential for parts). (February 8, 1971.)

Ontario Grape Growers' Marketing-for-Processing Order

By an amendment to this order, the Ontario Grape Growers' Marketing-for-Processing Board may collect levies on grapes marketed up to December 31, 1971. The amount of the levies shall not exceed the rate of \$5.00 per ton of grapes marketed. (February 16, 1971.)

Canada Grain Act

The new *Canada Grain Act*, passed by Parliament late last year, was proclaimed effective April 1, 1971. On the basis of information about customer demands, as supplied by the Canadian Wheat Board and extensive research, the Board of Grain Commissioners has recommended five new grades of Red Spring Wheat to replace the present eight grades. The first new grade registered will be called No. 1 CANADA WESTERN RED SPRING WHEAT and will encompass about 50 percent of the total Red Spring Wheat produced on the Canadian prairies. Effective August 1, 1971, the grades No. 1 Hard and No. 1 and No. 2 Northern will no longer apply at the country elevators.

A revision was also introduced in the grade specification for Canadian Western Amber Durum Wheat, including the deletion of No. 6 Canadian Western Grade.

The new *Canada Grain Act* recognizes protein as a quality factor in the grading of Western Red Spring Wheat. When the new wheat grade comes into use on August 1, 1971, a segregation will be made, on receipts at terminal elevators on the basis of protein levels. These levels will be 13, 14 and 15 percent and also, where specified by the Commission, 12 and 16 percent. Accordingly, the Canadian Wheat Board will be in a position to begin merchandising wheat on a protein basis. Under the new Act, the Board of Grain Commissioners for Canada is renamed the Canadian Grain Commission.

Canadian Dairy Commission (Increases of its purchase prices)

The Canadian Dairy Commission announced, in early February 1971, the first increases of its purchase prices on skim milk powder and cheddar cheese in four years. These increases, aimed at improving the market prices to producers of manufacturing milk, are the following: (1) the price for skim milk powder went from 20 to 24 cents a pound, while (2) the basic price for cheddar cheese was increased from 47 to 51 cents a pound, which was slightly below the prevailing market price.

These increases will have little effect on consumer prices. The situation on skim milk powder has changed drastically in the past year. While production of this commodity is still considerably in excess of Canadian use, the price in export markets has improved substantially and the Commission expected to have disposed of virtually all its stocks when the new heavy producing season started in April.

Canadian Dairy Commission and milk marketing agencies in Ontario and Quebec have also signed an agreement which establishes market sharing quotas to producers for all milk which goes into manufactured dairy products. Under the market sharing quota system, there is a levy on the market price paid to producers, instead of the holdback from subsidy.

Crop Insurance Amendment

Amendments to the *Crop Insurance Act* were approved by the House of Commons, on February 26, 1971.

These amendments permit insurance against loss arising when the seeding or planting of a crop is prevented by excess ground moisture, weather or other agricultural hazards. At present, this type of insurance applies only to summerfallowed land.

The insurance will cover 80 percent of the average costs of preparing the land for seeding or planting. Two provinces, Ontario and Manitoba, had already expressed an interest in this type of insurance. (February 26, 1971.)

Forage Program

A three-year \$40,000,000 program that will offer Prairie grain producers \$10 an acre to switch crop and summerfallow acreage into forage production was announced. The announcement was made at the end of February 1971, jointly by Agriculture Minister, the Hon. H. A. (Bud) Olson and the Hon. Otto Lang, Minister Responsible for the Canadian Wheat Board.

"The incentive payment will expand forage production to meet the needs of our growing livestock industry," Mr. Olson said, and "as this industry expands to meet a growing consumer demand, the Prairie farm economy will gain stability through diversification".

The program will be administered by the CDA through the Prairie Farm Assistance Act with headquarters in Regina. This is the agency that administered Operation LIFT last year.

The incentive payments will be offered only to farmers who hold a Canadian Wheat Board permit book. In order to qualify, farmers will be required to increase forage acreage by seeding land which was cultivated and not in perennial forage last year.

The minimum application will be 25 acres per year. There will be no maximum. The program will be completely voluntary, and will apply for three years or to a maximum of 4,000,000 acres, whichever limit is reached first. (February 22, 1971.)

Canadian Wheat Board Initial Payments and Quotas Expected

For the first time, the Government of Canada has announced initial payments in advance of spring seeding.

The initial payment for No. 1 Canada Western Red Spring Wheat* will be \$1.46 per bushel, for No. 3 Canada Western Six Row Barley 91 cents per bushel and for No. 2 Canada Western Oats 60 cents per bushel.

Total quota to levels for the 1971-72 year will not be known until this time next year.

The Hon. Otto Lang, Minister responsible for the Wheat Board has made "guesstimates" of what these quota levels might be:

**Wheat: 8 to 10 bu. per assigned acre

Barley: 12 to 15 bu. per assigned acre

Oats: 7 or 8 bu. per assigned acre

The number of acres that producers assign to each grain this spring will have a major influence on the 1971-72 quota level.

Canadian Wheat Board permit holders were assured of a minimum total delivery by producers of 388 million bushels of wheat, 230 million bushels of barley and 45 million bushels of oats in the coming crop year. (March 1, 1971).

Final Payments on Barley and Oats

Producers delivered 163,447,113 bushels of barley and 17,951,808 bushels of oats to the Canadian Wheat Board in the 1969-70 crop year. The total of this delivered grain has already been sold and there will be no barley or oats transferred to the 1970-71 pool accounts. The amounts of final payments to be distributed are \$4,313,137 for barley and \$1,737,672 for oats.

These are not payments by the Government of Canada, but represent the net returns of the Canadian Wheat Board from the marketing of Western Canadian barley and oats for the 1969-70 crop year. The final payments are being made on a grade basis, the average final payment being 2.6 cents per bushel for barley and 9.7 cents per bushel for oats, respectively.

Interim Payments to Ontario Bean Producers

The Ontario Bean Producers' Marketing Board has submitted a statement which shows that the proceeds of sales of pea beans and yellow-eye beans exceed the advance made to primary producers, plus carrying and processing costs, in sufficient amount to permit the distribution by the Board of the interim payments to producers.

The Board has therefore been authorized to make the following payments: \$2.25 per hundredweight of pea beans, and \$5.00 per hundredweight of yellow-eye beans. (March 1, 1971.)

Regional Development Incentives Act

RDI regulations were amended to exclude all "initial processing operations". A short summary of this part of the regulations is provided for the interest of our readers and as a classification index.

*See the paragraph on *Canada Grain Act*, for a description of this new grade.

**This is all wheat, including durum.

For the purpose of the Regional Development Incentives Act an eligible "commercial operation" is any commercial undertaking, other than

- 1—an initial processing operation
- 2—a manufacturing or processing operation described in paragraph 2.
- 3—an operation in a resource based industry.

1) an "initial processing operation" means an operation the product of which is a fuel or a material mainly used for further processing or manufacturing, but does not include

- (1) the processing of mineral concentrates to produce metals,
- (2) the converting of wood pulp into paperboard or paper other than newsprint, or
- (3) the processing, other than oil refining, of a product resulting in a significant chemical change in the principal material used; which are eligible operations.

2) a manufacturing or processing operation means an operation whereby any goods, products, commodities, or wares are created, fabricated, refined or made more marketable but does not include

- (i) the transporting or merchandising of any goods,
 - (ii) the growing, catching or harvesting of any natural or cultivated product of nature,
 - (iii) the extracting of minerals by any method,
 - (iv) the production of energy except as an integrated part of "manufacturing" as described,
 - (v) the grinding, mixing or blending of fertilizers or feedstuffs,
 - (vi) the mixing of concrete or asphalt,
 - (vii) the drying of hides,
 - (viii) the cleaning or drying of peat or Irish moss,
 - (ix) stone cutting or polishing,
 - (x) salt or potash extraction,
 - (xi) any mobile manufacturing or processing operation,
 - (xii) construction work,
 - (xiii) repairing as distinct from rebuilding,
 - (xiv) the rendering of consumer services, and
 - (xv) publishing other than printing.
- 3) a "resource based industry" means an industry that uses as a principal material a material
- i) the original location of which is not the consequence of human design, and
 - ii) that is in or close to its natural state".

WHAT IS HAPPENING ABROAD IN POLICY AND PROGRAM DEVELOPMENTS

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

World agricultural production in 1970: a Review

In **western Europe**, the stability of output was the combined result of decreases in the production of cereals and, to a lesser extent, sugar beet and milk—all commodities currently in surplus. These decreases were more or less offset by modest increases in the output of a number of other major commodities, including most types of meat, potatoes and olive oil. Smaller cereal crops were largely responsible for the stable level of output in North America and Oceania. There were particularly steep reductions in the wheat crops of **Canada and Australia**, and in **North America**, coarse-grain production was also smaller. In **eastern Europe and the USSR**, on the other hand, cereal crops showed a partial recovery, especially wheat, and this, together with larger harvests of potatoes and oilseeds, was mainly responsible for the increase that is estimated to have taken place.

In **Latin America**, the indications were for some acceleration in the growth of output, following two years of disappointing over-all results. The majority of countries of the region appear to have participated in this improvement, despite steep reduction in the Argentine wheat production and in the Brazilian coffee crop. No quantitative estimate can as yet be made of the change in other developing regions. In the **Far East**, wheat crops are estimated to be larger in India and Pakistan. For rice, weather conditions have so far been reported to be generally favorable, but no harvest estimate can as yet be hazarded. Data for the **Near East and Africa** are even fewer. In the former region, the total cereal crop may be down, with reduced crops of wheat and barley in some major producing countries, and cotton production may also be smaller. For Africa, information is so far limited to some of the major cash crops. Little change is expected to have taken place in coffee and cocoa production; that of tea may have fallen somewhat. Olive oil production has recovered from last year's decline, and that of palm oil continued to increase, but groundnut production is expected to be smaller. Cotton production is thought likely to have risen. Excellent corn crops were reported from Kenya and Tanzania. [The State of Food and Agriculture, 1970. FAO, Rome 1970].

Australia's difficult growing season

Total estimated wheat production for the 1970-71 season, at 290 million bushels, is much lower than last year's figure of 392 million bushels. All States, with the exception of Western Australia, had a difficult growing season.

The national quota of 318 million bushels, set for the 1970-71 season helped reduce the acreage from 23.4 million acres in 1969-70 to an estimated 16.5 million acres in 1970-71. In terms of yield, the estimated 17.5 bushels per acre is slightly higher than the 17.0 bushels in 1969-70 but much lower than the 20.3 bushels per acre in 1968-69. The 10-year average yield (1960-61 to 1970-71) was 18.3 bushels per acre. (The Canadian average for the same 10-year period was about 22.2 bushels per acre). [Canadian Assistant Commercial Secretary, Melbourne]

Potato problems in France

For several weeks, Northern French growers have been demonstrating (violently in some cases) to force the Government to take action about the extremely low-prices (as low as 1¢/lb.) paid to producers for their potatoes. The authorities have now agreed to set up a regulatory stock of 50,000 metric tons purchased at 1¼¢/lb. The growers do not consider this sufficient and want more assistance including a grant of 10 million Francs from the FORMA (Fund for the Orientation and Regulation of Agricultural Markets) to withdraw potatoes from the market. [Canadian Commercial Secretary (Agriculture) Paris]

International Wheat Agreement, 1971

Agreement on the form of a new International Wheat Agreement to be effective July 1 1971, was reached in Geneva on February 20, 1971. This new agreement will have two conventions, one for wheat marketing and the other for food aid. It differs significantly from previous agreements in that there are no obligations on minimum or maximum prices and no obligations on quantities to be sold and purchased. The Agreement provides for consultation in the

event of actual or threatened market instability, including price fluctuation, to seek ways to arrive at mutually acceptable solutions. Provision is made to renegotiate an agreement containing price provisions when the International Wheat Council believes such a negotiation can be successful.

Commitments under the Food Aid Convention are about four million metric tons a year—a decrease from 4.3 million metric tons in the 1967 convention. Canada's contribution remains the same at 495,000 metric tons.

Signatories to the Food Aid Convention must accept the Wheat Trade Convention, but signatories of the Wheat Trade Convention need not accept the Food Aid Convention.

The Honourable Otto E. Lang, Minister for the Canadian Wheat Board, has indicated that Canada will sign both conventions of the International Wheat Agreement, 1971.

Northeastern Agricultural Economics Council

Officially affiliated with the American Agricultural Economics Association, this Council was established at the annual meeting of the New England Agricultural Economics Council in June of 1970. The purpose of the Council is to stimulate and promote education and research on economic and social problems related to production, marketing and consumption of agricultural products and the inter-relationships of agriculture and the rest of the economy.

The Council's executive includes the heads of the agricultural economics departments of the land grant institutions of the Northeastern states, and a representative selected from heads of departments at Nova Scotia Agricultural College, Macdonald College, Laval University, and one agricultural economist from the USDA.

The Council will hold an annual meeting each year in late June and will publish the proceedings.

Annual membership is \$3.00; students \$1.00. Dues may be sent to the Secretary-Treasurer, Malcolm Bevins, Department of Agricultural Economics, University of Vermont, Burlington, Vermont.

PUBLICATIONS

Economics Branch Publications

Mini Outlook, Market Outlook Section, Marketing and Trade Division, Economics Branch, Canada Department of Agriculture, Ottawa. Pub. No. 5025. pp. 45 (Also in French, Pub. No. 5025F pp. 54).

This publication, the first annual March Outlook, outlines the prospects for the production and marketing of the major agricultural commodities in the year ahead.

Marketing Boards '69, K. E. Cann, Economics Branch, Canada Department of Agriculture, Ottawa. Pub. No. 71/2. pp. 19. Bilingual.

This publication is the thirteenth annual report summarizing data from marketing boards in the ten provinces and shows the relative importance of marketing boards in marketing Canadian agricultural products.

Machinery Costs on Prairie Wheat Farms, L. M. Johnson, Prairie Regional Office, Economics Branch, Canada Department of Agriculture, Regina, Saskatchewan. Pub. No. 71/1. pp. 48. (English only).

This publication reports in detail on machinery usage in west central Saskatchewan. Data is presented on the number, age, size, ownership cost and operating cost of major machines in preparing fallow and producing grain.

Canada Department of Agriculture Publications available from Information Division, CDA, Ottawa. KIA 0C5

Crop and Seasonal Price Summaries. Markets Information Section, Production and Marketing Branch. Vol. 23, 1969/70, Part II: Fresh and processed fruits and vegetables. pp. 51. Free. Bilingual. Cat. No. A77-12/23-2.

Canadian Livestock Feed Board—Office canadien des provenides. Annual report of the Canadian Livestock Feed Board, crop year 1969/70. English text, pp. 27. Tables. Paper cover. Free. Bilingual.

Management of the Western Range. Ottawa 1971. pp. 34. Illustrated, tables, figures, maps. Paper cover. English only. Free. Cat. No. A53-1425.

Other Publications

Economic Thinking in a Canadian Context. Gordon F. Boreham and Richard H. Leftwich. Holt, Rinehart and Winston, Toronto/Montreal, 1971.

Of particular interest to readers is Chapter 14, "Government and Agriculture", pp. 264-294. This chapter covers the following topics: Agricultural Problems, the Low-Income Problem, the Instability Problem, Government Responses, Price Supports, the Canadian Wheat Board, Supply Restrictions, the Canadian Experience and An Appraisal of the Farm Program.

How Your Tax Dollar is Spent: A taxpayer's introduction to the spending plans of the Government of Canada for the fiscal year beginning April 1, 1971. Ottawa, 1971. English text, pp. 31. Illustrated, tables, charts. Paper cover. Free. Bilingual. Cat. No. BT 47-171. Available from Information Canada.

The following publications are available from the Publications Distributions Unit, DBS, Ottawa 3.

Canadian Statistical Review. Monthly. Also in French. 50¢ per copy. \$5.00 per year. Cat. No. CS11-003.

Index Numbers of Farm Prices of Agricultural Products. Monthly. English only. 10¢ per copy. \$1.00 per year. Cat. No. CS62-003.

Report on the Poultry Survey of December 1970. Bilingual. 25¢ per copy. 50¢ per year. Cat. No. CS23-006.

Report on Livestock Survey: Pigs, December 1, 1970. Bilingual. 25¢ per copy. \$1.00 per year. Cat. No. CS23-005.

Farm Implement and Equipment Sales. Monthly. Bilingual. 10¢ per copy. \$1.00 per year. Cat. No. CS63-009.

Field Crop Reporting Series, 1971. No. 1—Summer-fallow and stubble, acreage and yield of specified crops, Prairie Provinces. Released Jan. 20, 1971. Also in French. 20¢ per copy. \$4.00 for a series of 20 reports. Cat. No. CS22-002.

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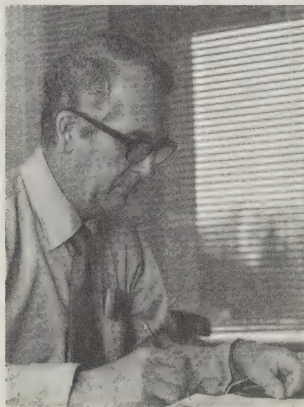
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CANADIAN FARM ECONOMICS

CRITERIA INVOLVED IN THE ALLOCATION OF AGRICULTURAL RESEARCH RESOURCES

Decisions on research resource allocation should be made on the basis of objective analyses. Benefit/cost analysis, even with its limitations, is the best approach presently available. However, for small projects, a benefit/cost analysis may be too expensive. Even so, judgement techniques can be made more objective, thus optimizing resource allocation and research benefits.



*Varge Gilchrist**

At the outset, time will not be taken in this paper to assign significance to differences between "agricultural research" and non-agricultural research with regard to criteria in allocating research resources, nor to discuss implications of difference. The objective is to discuss the matter of criteria and allocation. Whatever follows applies to agricultural research. The title seems to hold out a certain promise that the author will provide readers with a set or sets of

criteria and possibly a method of allocation that can be used straightway by anyone whose responsibility it is to allocate resources for research. One must bluntly dash such hopes immediately, mainly because explorations in this field to date are fairly theoretical and some distance from maturity in application¹, and secondly, because one cannot presume to accomplish this in the time available to prepare this paper. I can only hope to contribute to the dialogue that is developing and which, I trust, is gradually clarifying the task of research management.

THE PROBLEM AND THE HOPE

Why the concern, which surely we all feel, over criteria? Do we really have a problem here? The answer is: Yes indeed! For several reasons, the inescapable necessity to choose for implementation only the best from among many good research projects and programs, and discard the rest, has become a fact of life for the research manager. Most

This article is based on a speech presented to the Symposium on Agricultural Research, Department of Agricultural Economics, University of Manitoba in Winnipeg on March 9, 1971. A copy of the proceedings of the Symposium can be obtained from the University.

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¹A considerable literature on the subject has developed in the past fifteen years. An appendix is attached as a bibliography which was made available to Professor Warley by G. Allen, Department of Agricultural Economics, University of California, Davis, California.

institutions, including those that have research as one of their activities, are currently going through a rigorous examination of their performance efficiency. Reviews of objectives and re-allocation of available resources for more effectiveness are the order of the day. They can no longer afford the luxury of inefficiency. Although research is about the last function of corporate, university and government institutions engaged therein to come under this close budget scrutiny, it has not escaped—nor should it.

One might conjecture as to why reasonably adequate funds have been available for growing research activities in the past. Perhaps it is a Newtonian legacy of the idea that scholarly enquiry and its academic setting is a form of “high culture” and therefore should be supported, even though it is not necessarily socially useful at times. Because people doing research for governments and corporations come out of an academic environment, the legacy tends to be self-perpetuating.

Perhaps adequate funds have been available because the system has produced, in spite of inefficiencies. For example, Canadian agriculture has provided high quality, relatively low cost food, in abundance. This material output of research has fitted well into our society's preoccupation with growth in material welfare.

However, the relevance of expenditures of vast and increasing resources on research that results mainly in material wealth is being called into question more and more by the public, who provide most of those resources one way or another. There is the growing feeling that such a large investment in research ought to contribute more than it does to improving the quality of life. Why is the product of our research aggravating rather than alleviating our problems?²

Why is Canadian agriculture having such adjustment pains? Why is it in a state of chaos wherein management decision-making faces growing uncertainty? Why the disparity of incomes in agriculture and between agriculture and the other sectors of the economy? How is it that pollution has suddenly become such a major and severe problem? These questions suffice to illustrate the point.

The introduction of program planning and budgeting by governments, beginning in the U.S.A. in

1965, is another reason why research is only now coming under scrutiny, at least in governments—and it may apply to universities and corporations as well. Prior to PPB, so called “process budgeting”, was the methodology for planning government expenditures (2). By this method “budgeting is treated as the process of financing existing commitments and of creating some new commitments, both being aimed at maintaining the process or activity”. The assumption is that if the activity is working properly, the outcome will be favorable. “There is no need for an explicit examination of outcomes; one can evaluate the process itself to determine its performance and desirability” (2).



The key metaphor of PPB is “systems”, rather than “process”. Here it is the outcome not the activity that is evaluated. “The distinctive element is the analysis of alternative opportunities.” Traditional budgeting procedures have not been very efficient in dealing with changing goals. The rising concern over goals has been accompanied by new decisional technologies associated with economic and systems analysis. PPB and “management by objectives” are major results of these developments.

²For an example of one expression of this misallocation of research resources see (1).

This new environment that imposes increasing rigor on the research manager's decision-making, also forces him to defend his decisions. Decisions are more consistent and easier to defend if an objective decision-making mechanism is available. This often amounts to defending the importance of the research in terms of what is given up if it is not carried out.

The key component of such a mechanism is a set of criteria by which to evaluate alternatives. Every person who has to decide on which research projects and programs to implement, and which to reject, struggles with the problem of criteria and their consistent application. This is the problem with which I also struggle in this paper.

Some research managers have tried the explicit, objective approach and have found so many difficulties that they have settled for decisions based on mature "judgement" of one or more persons. This latter approach creates problems of inconsistency as evaluators vary and forces any defence of decisions to rely on the anonymity of a committee or on an authoritative position. Given adequate introspection and persistence, it should be possible to identify subjective criteria and articulate them explicitly, to permit their evaluation by logic and experience. The hope is that over time a reasonably objective decision-making mechanism can therefore be developed and refined.

Let us explore possibilities. Although the exploration will not pretend to be exhaustive or comprehensive, I hope the results will contribute to the objectives of this series of seminars.

COMPLICATIONS IN DEVELOPING CRITERIA

In allocating relatively scarce resources for research purposes the "best" use of those resources is being sought for the owners by whoever is responsible for allocation. Alternative opportunities must, therefore, be evaluated. The basic activity or entity for evaluation is the project, which is the collection of inputs and procedures that are combined to reach an objective, usually a solution to a problem. Precision in evaluation depends upon the clarity with which the objective is defined so that the inputs and benefits can be related to the objective. A collection of related projects is usually called a program.

³At least ceilings or limits are placed on funds going to research.

⁴For purposes of this paper, we will ignore the problems of allocating resources within a single project.

Levels of Decision

So we find several levels of aggregation at which decisions may be made on investments in research. Even at the project level, there are decisions to be made on alternative ways of using the resources available. Wherever an input-output entity is definable, a decision is required. These entities are aggregated for management purposes into projects and programs. Allocative decisions on research are being made by project leaders, by program co-ordinators, by research directors, by department heads and by financial controllers, e.g., treasury boards.

At each level there are different goals and criteria. At the highest level decisions are made on the total resources allocated to agricultural research and alternative uses of those resources.³ Concern here is with what is best for society. At a lower level decisions are made on allocations to major disciplines, such as biological sciences, social sciences and physical sciences, which compete for resources. Concern here is for what is best for the agricultural sector. Within, say, the biological sciences, plant science, animal science, entomology, etc., compete. Within plant science there are wheat research, barley research, alfalfa research, etc. And within wheat research, there are numerous projects competing for research resources.⁴

Differences in Goals

In the search for criteria, the literature dealing with resource allocation in research invariably starts with the goals of the research manager who is responsible for allocation. These goals differ considerably, of course, so that it is difficult to develop a set of criteria that are common to all research agencies.

Most research agencies must establish and maintain a "critical mass" of staff and resource mix to be effective. It is practical to recognize that activities that ensure funds share top priorities. Thus one or more criteria used by a particular research agency will derive from the goals and objectives of the top decision-makers who control the availability of funds for that agency.

Research by government agencies is primarily problem oriented. Continual pressures exist for solutions so that project and program objectives tend to be of shorter run compared with university research. Problems are articulated by management, or by researchers and approved by management. The need for building professional reputations is secondary and they are built on the quality of work in those opportunities decided on by management.

In universities on the other hand, more attention is paid by management to advancing scholarship and pushing out the theoretical frontiers. Management's need for keeping this uppermost in mind in attracting and retaining staff affects decisions on allocations of research resources. The "clients" at whom research is focussed tend to be peers, so there is more concern with methodology, concepts and theory and the selection of problems that are discipline oriented, intellectually satisfying and that contribute more to advancement of scholarship. A considerable amount of research is done primarily for these purposes. Nevertheless, the need for continual funding demands relevance to current problems of society and most projects are conceived with this orientation; however, university researchers tend to move more readily into the abstract if a study leads them there.⁵

In spite of these practical considerations that cause variations in criteria, both university and government research agencies obtain the bulk of their research funds from the same source, the public. They must be sensitive to society's problems including those of the food and agriculture sector. For this reason, they likely have a sizeable area of common ground in criteria for evaluating research and allocating resources.⁶

Selection of Criteria

Even though a research organization is able to identify and define its objectives, the selection of appropriate criteria by which to rank projects and programs and allocate resources presents problems. The usual criteria for ranking projects in terms of economic efficiency are benefit/cost ratios, net present value, internal rate of return or net contribution to the GNP.⁷ Society's objectives are not all economic, however. They include important objectives such as redistribution of incomes, national self-sufficiency, quality of life and others.⁷

⁵For comments on the influence of the professor on research priorities see (3). Those who manage public funds going into research must recognize the importance of developing the disciplines and that the criteria for the necessary type of research have lower appeal to funding agencies than problem or mission oriented criteria. It may be necessary to make a decision to allocate "x" per cent of available resources to discipline oriented research and separate it from the allocation procedures applied to research that is mission oriented.

⁶Any serious attempt to co-ordinate research would first require a depth study of criteria used by managers who allocate resources to research, to note patterns in objectives and criteria and to discern opportunities for commonalities and consistency.

⁷Andarawewa provides a good up-to-date capsule treatment of considerations in evaluating public research programs in agriculture, especially his review of potential gains from and limitations in research evaluation (6).

It is difficult to deal with these latter criteria in the models that have been developed for numerical evaluation.

NUMERICAL CRITERIA AND RESOURCE ALLOCATION

Several types of models are available for dealing with the allocation problem and providing criteria for project selection. All of them require some kind of measurement of economic and social benefits and costs.

Economic Models

Economic models are available for optimizing the allocation of unlimited resources (5), (6). The resources available are actually used at the project level, except for those resources going into administration at the higher levels of aggregation. If the decision makers allocating resources at the top could consider all research projects without the constraints imposed by the intervening decision-making hierarchy, theoretically they could optimize resource allocation among research projects and between these projects and alternative investment opportunities by equating for all alternatives the contribution to value made by an extra dollar of investment. However, the application of the principles of optimization encounters far greater obstacles in the production of knowledge than in the production of the usual run of goods and services. Some of these obstacles raise doubts about the extent to which research activities are amenable to rationalization (7). Also, these optimizing principles do not take into account the effects of research on the distribution of income.

The use of benefit/cost ratios for allocating resources optimally is consistent with these so-called marginal conditions. Unlimited resources can be allocated optimally to all projects for which the benefit/cost ratio is unity or greater (8). A limited quantity of resources available to any research manager can be allocated best among the projects for which he is responsible by ordering the projects according to benefit/cost ratio and allocating funds, starting with the project with the highest ratio and moving down the list, until the funds are fully allocated. Any other allocation will result in a sacrifice of total net benefits available. Note that this method requires comparisons of individual projects across program groupings because comparisons of total programs likely would result in the rejection of some projects with higher ratios than others that are accepted. Theoretically, mathematical programming concepts could also be applied to determine the optimum

allocation of restricted resources among various programs of research.

It is a necessary condition that all benefits (social, economic and even political) and costs can be identified and measured in units that are comparable among all projects. Since these benefits and costs arise or are incurred in the future, they must also be estimable in probability terms.⁸

In connection with decisions at top (Treasury Board) levels of aggregation, a few comments on returns on investment in agricultural research are appropriate. Decisions at this level are concerned with uses of funds as alternatives to adding more funds to research. If the profitability of investments in past research in agriculture is any guide for the future, there are reasonably well documented grounds for allocating funds to agricultural research until diminishing returns reduce profitability to a par with

alternative uses of funds. Table 1 shows rates of returns from different studies that lead to the clear overall conclusion that the return to agricultural research and extension, in the United States at least, is high relative to more traditional investment.

Can we not safely assume that similar rates of payoff have been experienced in Canada?

Statistical Models

Statistical decision theory provides other methods for systematic decision criteria that take risk and uncertainty into account, e.g., the “maximin” criterion, the “minimax” criterion and the “Hurwicz” criterion (11). Any practical application of these also requires probability estimates of outcomes of each project and the utility or evaluation of those outcomes.

Judgement Models

Another method of evaluation may be suggested which is not so precise, but which is consistent with the allocation theory and which is somewhat easier to apply in practice, because it allows for a considerable amount of judgement. It is an application of an elementary and perhaps not too recent method used by managers to deal with the problem of deciding systematically on alternatives, e.g., tenders for a contract. Briefly, the decision maker lists as clearly as possible all significant criteria relevant to the decision. Some of them likely will be basic requirements, any one of which eliminates the proposals that fail to fulfill it. The remaining criteria are weighted according to their importance. All proposals are then rated against one criterion at a time in three to five degrees, e.g., A, B, C or Excellent, Very Good, Average, Fair, Poor. These can be given simple numerical values of 3, 2 and 1 corresponding to A, B and C or 5, 4, 3, 2 and 1 corresponding to the other evaluation. The sum of

TABLE 1—SUMMARY OF STUDIES ESTIMATING AVERAGE AND MARGINAL INTERNAL RATES OF RETURN TO AGRICULTURAL RESEARCH AND EXTENSION IN THE UNITED STATES.

	Average return (percent)	Marginal return (percent)
1. Schultz, inputs saved technique extended for this paper.....	19	45
2. Griliches, aggregate production function, cross section data.....	—	53
3. Evenson, linear regression on residuals, time series data.....	—	48
4. Griliches, hybrid corn study.....	37	—
5. Peterson, poultry study.....	18	50

Source: Peterson, W. L., The Returns to Investment in Agricultural Research in the United States. University of Minnesota. Staff Paper P69-5. 1969.

⁸See also (5), (6), (9) and (10) and other papers from this series of seminars.

TABLE 2—PROJECT EVALUATION MODEL

Criteria and Weightings (W)													
Project No.	I			II			III			IV			Project Score
	W ₁	=	100	W ₂	=	90	W ₃	=	85	W ₄	=	80	
1	R ₁₁ [*]	S ₁₁	= W ₁ R ₁₁	R ₁₂	S ₁₂	= W ₂ R ₁₂	R ₁₃	S ₁₃	= W ₃ R ₁₃	R ₁₄	S ₁₄	= W ₄ R ₁₄	≤ S _{1j}
2	R ₂₁	S ₂₁	= W ₁ R ₂₁	R ₂₂	S ₂₂	= W ₂ R ₂₂	.....			.....			≤ S _{2j}
3	R ₃₁	S ₃₁	= W ₁ R ₃₁	R ₃₂	S ₃₂	= W ₂ R ₃₂	.....			.....			≤ S _{3j}

* R = Rating (1 to 5)

the criteria "weights" times the "evaluation" gives the total score for each project and the projects are rated relatively according to score. The discriminating power of the criteria is affected, of course, by the weightings. The method is illustrated in Table 2.

The staff of the Research Division of the Economics Branch, CDA, has explored the use of this method somewhat in evaluating proposed research projects in agricultural economics. At a workshop held a year or so ago, a system of criteria was developed which has since been applied on one or two occasions. Shortly following the workshop it was discovered that the method and the criteria correspond surprisingly closely to those described in 1967 by Fedkiw and Hjort (12), senior analyst and director, respectively of the Planning, Evaluation and Programming Staff Office of the Secretary, U.S. Department of Agriculture. It was interesting that the workshop had independently arrived at such close similarity, since no one attending had read the article previously. Pertinent comments in this article will be mentioned after presenting the list of criteria developed by the workshop:

"Must" Criteria

1. The study must be capable of completion in the time available, with the funds available and with the qualified staff available whose personal preferences do not eliminate them from doing the project.
2. There must be reasonable possibility of solving the problem.
3. The cost cannot exceed any previously established ceiling.
4. The problem must not be out of date.

Only projects that meet all of these criteria are included for evaluation.

"Evaluation" Criteria

Weighting

1. Degree of usefulness to decision makers concerned with agricultural policies and programs. (Useful information: problem clarification and definition; indication of where the situation is leading, can lead or should lead; alternatives and their social, economic and political consequences; etc.) 10

2. The urgency of the problem and pressure for solution. (How much time is available for the study before a decision will be taken? What is the nature and intensity of the effect of the problem on individuals and groups throughout the economy, including farmers—effects on current and future incomes and welfare and on social and economic adjustments? etc.) 9
3. The degree to which the research agency is responsible for the research or the problem. (Is this agency forced to deal with the problem? Should it? Are there other agencies equally responsible? Will the research get done if this agency doesn't do it? etc. Can the direct recipients of the results do or get the research done themselves? etc.) 8
4. The degree to which the research results contribute directly to the goals of the institution paying for it. 8
5. The net direct economic benefits to agriculture. 8
6. The net indirect economic benefits to agriculture and other sectors of the economy. 7
7. The probability of the results of the project being implemented within the next five years. 7
8. Importance of the sub-sector of agriculture affected, relative to the total sector, in terms of resources and people directly involved; effects on other sub-sectors; effects on the non-agricultural sectors of the economy, etc. 6

It may be noted that these criteria are a long way from eliminating the element of judgement. An attempt has been made to clarify the meaning of each criterion to induce more uniformity among evaluators, but considerably more clarification and specificity is needed. Also, the list may omit certain important considerations. We quickly learned, too, that clarity of project definition affects uniformity of results. Analysis based on experience and group

introspection that seeks the significant relevant elements of evaluation likely could achieve a system that would produce a consistent pattern of results with different evaluators. Goals such as those referred to by McMillan (5), i.e., productivity increases, income redistribution and non-farm opportunities for farmers, are implicit in criteria numbers 1, 2, 4, 5 and 6 above.

Fedkiw and Hjort report that for PPB their staff reviewed the original criteria carefully and found, as a similar review of the above criteria would find, that they were really different aspects of viewing expected benefits from research. Obviously, the above criteria are not mutually exclusive. Fedkiw and Hjort concluded that “the key to evaluation of research alternatives for planning and programming purposes lies in the area of estimating benefits” and “benefit/cost analysis is the only method which we have hit upon that promises to have wide applicability” (12). Peterson, in discussing their paper (13) comments:

“Before we throw out the ranking procedure as an evaluation technique, however, it might be useful to compare the results of the two techniques. If a simplified ranking scheme gives answers consistent with benefit-cost analysis and is a cheaper, more simple tool to use, then why not use it? I envision a large increase in the overhead cost of public research if every project is required to carry a rigorously calculated benefit-cost ratio or internal rate of return before it can be funded. For some projects this might require more resources than the project itself. We must recognize that there is a cost of obtaining information also.”

This rather naive method contains the basic elements of McMillan’s model (5, pp. 8-9). The criteria can be looked upon as goals (G) with their weightings (W). The evaluation of a project against a criterion expresses that project’s contribution (A) to the criterion (goal). The measure of the benefits of the research for Project j relative to Criterion i would be $BR_{ij}=W_iA_j$; and the measure of total benefits of the project would be W_iA_j summed across all criteria, which is the project’s total score (S_{ij}) referred to above (Table 2).

It may be noted that Criteria 5 and 6 imply a measure of economic benefits and costs from which a benefit/cost ratio can be obtained. Also, project costs are available for allocation purposes. Thus, the method of ranking by benefit/cost ratio, described above for allocating limited available resources, could be applied.

I am indebted to Professor Winter⁹ for another approach to the problem of the economic evaluation of research projects or programs. It attempts to recognize the problem of uncertainty (of research results) and of measurement in estimating costs and benefits. To cope with the problem of huge errors in estimating, the method uses an “order of magnitude” rather than dollars to measure costs and benefits. Correct order of magnitude figures imply that the estimates do not err by more than a multiple of 10. Probability of success is also estimated. The appraisal consists of determining by how much the order of magnitude of possible benefits exceeds the order of magnitude of anticipated costs. The method does not take into account non-economic criteria.

The following illustrates the idea of orders of magnitude:

Size of Number		Order of Magnitude
0.05—	0.005 (5×10^{-3})	—3
0.5 —	0.05 (5×10^{-2})	—2
0 —	0.5 (5×10^{-1})	—1
0 —	5 (5×10^{-0})	0
5 —	50 (5×10)	1
50 —	500 (5×10^2)	2
500 —	5,000 (5×10^3)	3
5,000 —	50,000 (5×10^4)	4
50,000 —	500,000 (5×10^5)	5
500,000 —	5,000,000 (5×10^6)	6
5,000,000 —	50,000,000 (5×10^7)	7
50,000,000 —	500,000,000 (5×10^8)	8
500,000,000 —	5,000,000,000 (5×10^9)	9
5,000,000,000 —	50,000,000,000 (5×10^{10})	10

A table is set up as in Table 3.

Such a table leads to several possible conclusions:

1. If it is impossible to estimate the order of magnitude of possible benefits of a project, then probably the project purpose has not been carefully thought out or adequately stated.
2. If it is not possible to indicate the order of magnitude of project costs, than the research has not been sufficiently planned.
3. If the estimated order of magnitude of benefits exceeds the estimated order of magnitude of costs, the project is probably a good one. Note that if estimated benefits exceed costs by one

⁹Head, Department of Agricultural Economics, University of British Columbia.

TABLE 3—ORDER OF MAGNITUDE ANALYSIS

Projects (1)	Beneficiaries (2)	How Payoff (3)	Max. O of M payoff (4)	Prob. of success (5)	Max. worth in O of M (6) (4-5)	Cost in O of M (7)	Expected payoff in O of M (8) (6-7)	Ranking of projects in payoff
Bulletin food costs	Consumers, Ag. Economists	Efficient buying	9	10% of consumers save 1% of budget — 3	6	4	2	1
Prairie geography	Rail costs	Lower costs, assembly grain	8	Small effect — 3	5	4	1	2
Advise grain	Farmers rail, elevator Cos.	Larger grain sales, lower grain costs	7	Small effect — 3	4	3	1	2
Grain atlas	Elevator Cos.	Better rail abandonment policy	7	Small effect — 3	4	4	0	3
Int. agriculture	Canadians	Better trade policy	10	Small effect — 3	7	5	2	1
Retail price report	Consumers	More efficient shopping	10	— 3	7	5	2	1
Commodity prices	Research design	Better research in future	6	— 3	3	4	-1	4
Price outlook	Researcher knowledge	Better Econ. Branch performance	6	— 2	4	5	-1	4

Column (3) refers to the payoff after the results of the research have been implemented.

Column (5) considers probability of implementation and magnitude of payoff from implementation.

Orders of Magnitude are power indices and are added algebraically to perform multiplication (Column 6) and division (Column 8).

order of magnitude, the expected return on investment is 10-fold; if by 2, the return is expected to be 100-fold.

- If estimated order of magnitude of costs exceeds estimated order of magnitude of benefits, the project should be re-examined.

It is clear that the preparation of a table such as this is useful in the sense that it forces us to think about the benefits and beneficiaries as well as costs of research projects. The method suggested merely provides a formal framework for an analysis that should be done in any event.

One of the general conclusions obtained from a table such as this is that our intuition is not always correct. For example, in row one, the total expenditures by Canadian consumers on food is so large (O of M = 9) that affecting even a very small part of that consumption (1 part in 1,000) yields an enormous payoff (order of magnitude 6 or millions of dollars). Without going through the sort of analysis suggested here, one might be tempted to dismiss the research as unimportant since it would probably only affect 10 percent or less of all consumers and even for those affected the saving would be small — perhaps 1 percent of all expenditures. This second order of smallness discourages us. In fact, tiny as is $(1/100) \times (1/10)$, it is overpowered by the huge size of consumer expenditure, $(1/100) \times (1/10) \times \$7,000,000,000 = \$7,000,000$.

OTHER CRITERIA AND RESOURCE ALLOCATION

Judgement of Top Researchers

Another view on allocation of research resources that likely finds considerable support among research managers¹⁰ is analogous to the *laissez faire* concept of the competitive market. Peterson (13) expresses this view as follows:

"... any good administrator should begin to feel very uneasy when his choice of projects differs significantly from that of his top researchers. I would argue that within any given discipline or profession there is an implicit market force operating to allocate resources efficiently. There is always the incentive for scientists to work on problems involving high payoffs, subject to the constraints of nature. The "big-name" scientists in any field do not earn their reputation working on insignificant problems."

The allocation problem changes slightly when considering the choice between two fields, for example, agronomy versus dairying, or, at the broadest level,

¹⁰My limited experience with managers of scientific research in Canada indicates that the proven ability of the project leader is a very important criterion in deciding on the importance of potential projects. It receives more attention than the potential benefits of the project, which is not to say that the latter are ignored. This indicates a considerable faith in the philosophy expressed by Peterson.

research versus other kinds of investment. In the very long run, there is much the same force or incentive operating to draw qualified people into areas of greatest need. Yet administrators must make short-run, day-to-day decisions with regard to who gets the money. We tend, however, to overestimate this problem. It is not generally a decision of all or nothing; the decision is mainly one of relatively small, marginal changes between fields."

However, Kaldor (7) is of the opinion that the invisible hand of the market plays a minor role in the organization of research activities.

Criteria from Canadian Federation of Agriculture Study

In 1966, the CFA did a study (14) on agricultural research in the report of which a chapter was devoted to research priorities. I shall quote directly from the *Summary of Views* that were encountered in the study:

Summary of Views

"The need to establish research priorities, and to carefully develop criteria for this purpose, were widely recognized and supported by a large majority of those surveyed. It was also the opinion of the majority that this task was a most complicated and difficult one for all types of research organizations the world over.

"The criteria that were identified fell into three broad categories, namely, the economic, the scientific and the political.

"The economic criteria included assessment of the longer run, anticipated problems and opportunities of the industry, based in part on domestic and international demand and supply projections. A proportion of the resources of research program should be used to attempt to prepare for the future. Economic criteria are also required for establishing priorities for current problems. The more important of these were said to be:

- (a) The economic importance of a problem requiring solution compared with the economic importance of other problems worked on or under consideration.*
- (b) The research undertakings that are most likely to yield the highest economic returns from the investment of the resources available.*

- (c) Whether a new problem has created a serious economic emergency.*
- (d) The economic potential of an agricultural product.*
- (e) The information sought is of a basic nature and considered essential to the solution of important economic problems.*

Scientific criteria which need to be taken into account include:

- (a) The availability and competence of scientists;*
- (b) Their attitudes and interests;*
- (c) The degree of influence they should exert on the selection of problems to be tackled in the research program;*
- (d) The likelihood of success in lessening or eliminating a given problem through research; and*
- (e) Scientific findings and work underway in other countries.*

"The political criteria involves the question of whether or not the knowledge and experience of people in the agricultural industry, but outside the research agencies themselves, should be exploited or ignored in the procedures used to establish research priorities.

"There is no disagreement about the importance and usefulness of the economic criteria, which were reported to be given first and foremost consideration. There was, however, widespread disagreement as to the relative merits of some of the various scientific criteria, the real value of the political criterion, and, finally, the degree of emphasis that is and should be given to both scientific and political criteria."

CONCLUSION

Sources of agricultural research funds in Canada are increasingly demanding efficiency in the use of those funds to solve the problems in the agricultural sector. Criteria used by managers in allocating resources in research must be relevant to these problems. Explicit criteria and systematic evaluation are sought to increase objectivity, consistency and efficiency in allocation and to make budget decisions and requests for increases more easily defensible. The search is greatly complicated by the levels of

administration in the decision-making structure, which is further complicated by differences in research institutions and their objectives. Thus a seemingly wide variety of criteria are influencing allocation decisions. "If the entire operation were based on a common analytical framework and a consistent goal structure, the results might prove useful in planning a more rational allocation of resources" (7). There are two fundamental influences that might inadvertently be resulting in some consistency of criteria in government and university research agencies: (1) In any organization carrying out research, the goals at one level of administration ought to be closely related to the goals at the next level (above and below), which ought to make it possible to develop a consistent goal structure for the entire organization, and (2) Both types of research agencies are financed mainly by the same source, the public.

The use of economic and statistical optimizing models holds some promise for systematic decision making, but extreme difficulties are encountered in obtaining required coefficients and in measuring all relevant "inputs" and "outputs". Of these, benefit/cost analysis offers the most promise as a tool, if its limitations are fully recognized.

The time and effort taken to intelligently apply these tools must be taken into account in evaluation activities, so that these tools tend to be used only for sizeable projects. There is a myriad of smaller projects for which an easier and quicker method may be necessary.

To date, no easy method exists for objective, systematic project and program evaluation and allocation of research resources. This results in the use of a great deal of judgement. Two methods have been outlined to utilize this judgement in a systematic way that could inject more objectivity and more consistency into the process, particularly with some refinement of the methods.

A recent study of the research requirements and priorities in beef marketing (15) provides a fitting conclusion for this paper:

"We have examined the literature on research management and the systems used for research planning and program and project evaluation by the USDA and the Meat and Livestock Commission in Britain. We are, accordingly, aware of both the difficulties and dangers of more formal systems of evaluating programs and allocating research funds

such as "management by objectives" and "planning, programming and budgeting". The difficulties include those of defining the goals and objectives of research; the selection of appropriate economic (and non-economic) criteria to rank programs and projects; and the identification and the measurement of all benefits and costs attributable to particular projects. The dangers include the possibility that distributional and other politically important aspects of research-based innovations in a pluralistic society will be neglected; that numerous, low-risk, short period projects in familiar areas will be encouraged at the expense of bigger, exploratory and pioneering studies; that "mission-orientated" enquiries will be over-encouraged relative to "basic" research; and that excessive control of researchers may inhibit their dedication and initiative. However, we believe that the ultimate test of research is in the world of problems not ideas; that scientists are not a cultural elite and that considerations of efficiency (and accountability) in their use of research funds are valid; and that formal systems of evaluating proposals can powerfully supplement (though not entirely replace) the informal judgement of researchers and research administrators in identifying the nodal points of needed enquiry. Accordingly, we regard it as exceedingly important that an effective objective method of research planning, programming budgeting and evaluation be established at an early date and applied, to the degree possible, to the program and projects advanced in this report."

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References

- (1) Report of the Senate Special Committee on Science Policy, V. 1, pp. 142-143; 207.
- (2) Schick, A., "Systems Politics and Budgeting". The Brookings Institution, Washington, D.C., 1969. Reprint 156.
- (3) Hildreth, R. J. "Issues and Implications in Current Procedures for Establishing Research Priorities". Jour. of Farm Econ., V. 48, No. 5, December 1966: 1647-1648.
- (4) Andarawewa, A. B. "Evaluation of Public Research Programs in Agriculture". Can. Jour. of Agric. Econ., November 1969: 157-169.
- (5) McMillan, J. A. "Feasibility of Cost-Benefit Analysis for the Evaluation of Agricultural Research Projects". Symposium on Agricultural Research, Department of Agricultural Economics, University of Manitoba, January 20, 1971.

- (6) Steiner, P. O. "Choosing Among Alternative Public Investments in the Water Resource Field". Chapter 4 in Smith, S. C. and Castle, E. N. (edit.). *Economics and Public Policy in Water Resource Development*. Iowa State University Press, Ames, Iowa, 1964.
 - (7) Kaldor, D. R. "A Framework for Establishing Research Priorities". *Jour. of Farm Econ.*, V. 48, No. 5, December 1966.
 - (8) Eckstein, O. "Water Resource Development: The Economics of Project Evaluation". Harvard University Press, Cambridge, Mass., 1958. Chapter II.
 - (9) Walsh, H. G. and Williams, A. "Current Issues in Cost-Benefit Analysis". CAS Occasional Paper No. 11, Her Majesty's Stationery Office, London, 1969.
 - (10) OECD Bulletin: "The Management of Agricultural Research". OECD, Paris, 1970.
 - (11) Peston, M. and Coddington, A. "Statistical Design Theory". CAS Occasional Paper No. 7, Her Majesty's Stationery Office, London, 1968.
 - (12) Fedkiw, J. and Hjort, H. W. "The PPB Approach to Research Evaluation". *Jour. of Farm Econ.*, V. 49, No. 5, December 1967: 1426-1434.
 - (13) Peterson, W. L. "Discussion: The PPB Approach to Research Evaluation". *Jour. of Farm Econ.*, V. 49, No. 5, December 1967: 1424-1436.
 - (14) Canadian Federation of Agriculture Report: "Agricultural Research Study". Ottawa, 1966. mimeo.
 - (15) Marshal, R., Huff, H. B. and Warley, T. K. "Beef Marketing Research Report". Commissioned by the Economics Branch, Canada Department of Agriculture, Ottawa. (To be published in 1971.)
- Tichenor, P. J., and V. W. Ruttan, "Resource Allocation in Agricultural Research: The Minnesota Symposium", Preliminary Report, Agricultural Experiment Station, University of Minnesota, 1969, 15 pp.
- Tang, A. M., "Research and Education in Japanese Agricultural Development", *Economic Studies Quarterly*, 13: 27-41 and 13:91-99, February and May 1963.
- Anderson, J. R., and J. L. Dillon, "Economic Considerations in Response Research", *American Journal of Agricultural Economics*, 50:130-142, February 1968.
- Arrow, K. J., "Economic Welfare and the Allocation of Resources for Invention", in *Universities-NBER, The Rate and Direction of Inventive Activity: Economics and Social Factors*, Princeton, N.J., Princeton University Press, 1962, pp. 609-626.
- Asher, D. I., "A Linear Programming Model for the Allocation of R&D Efforts", *IRE Trans. Engng. Mgmt.*, EM-9: 154-157, December 1962.
- Asher, D. I., and S. Disman, "Operations Research in R&D", *Chem. Engng. Prog.*, 59:41-00, January 1963.
- Atkinson, A. C., and A. H. Bobis, "A Mathematical Basis for the Selection of Research Projects", *IEEE Trans. Engng. Mgmt.*, EM-16:2-8, February 1969.
- Baker, W. R., and W. H. Pound, "R&D Project Selection: Where We Stand", *IEEE Trans. Engng. Mgmt.*, EM-11: 124-134, December 1964.
- De Cicco, R. W., "Economic Evaluation of Research Projects by Computer", *Chem. Engng.*, 75(6):84-90, June 1968.
- Cramer, R., and B. Smith, "Decision Models for the Selection of Research Projects", *Engineering Economist*, 911-920, 1964.
- Dean, B. V., and M. J. Nishry, "Scoring and Profitability Models for Evaluating and Selecting Engineering Projects", *Ops Res.*, 13:550-570, July-August 1965.
- Disman, S., "Selecting R&D Projects for Profit", *Chem. Engng.*, 69(26):87-90, December 1962.
- Eckenrode, R. T., "Weighting Multiple Criteria", *Mgmt. Sci.*, 12:180-192, November 1965.
- Freeman, R. J., "A Stochastic Model for Determining the Size and Allocation of the Research Budget", *IRE Trans., Engng. Mgmt.*, EM-7:2-7, March 1960.
- Gargiulo, G. R., J. Hannoch, D. B. Hertz, and T. Zang, "Developing Systematic Procedures for Directing Research Programs", *IRE Trans. Engng. Mgmt.*, EM-8:24-29, March 1961.
- Gilfillan, S. C., "A Sociologist Looks at Technical Prediction", in J. R. Bright (ed) *Technological Forecasting for Industry and Government*, Englewood Cliffs, N.J., Prentice-Hall, 1968, pp. 3-34.
- Hamberg, D., *R&D: Essays on the Economics of Research and Development*, ch. 7, pp. 149-162, New York: Random House, Inc., 1966.
- Hart, A., "A Chart for Evaluating Product Research and Development Projects", *Opl. Res. Q.*, 17:347-58, December 1966.
- Hart, A., "Evaluation of Research and Development Projects", *Chem. Ind.*, No. 2:549-554, March 27, 1965.
- Hess, S. W., "A Dynamic Programming Approach to R&D Budgeting and Project Selection", *IRE Trans. Engng. Mgmt.*, EM-9:170-179, December 1962.
- Hess, S. W., and H. A. Quigley, "Analysis of Risk in Investments Using Monte Carlo Techniques", *Chem. Engng. Prog. Symp. Ser.*, 42, 59:55-63, 1963.
- Hillier, F. S., "The Derivation of Probabalistic Information for the Evaluation of Risky Investments", *Mgmt. Sci.*, 000:443-457, April 1963.

BIBLIOGRAPHY

Cetron, M. J., J. Martino, and L. Roedcke, "The Selection of R&D Program Content—Survey of Quantitative Methods", *IEEE Transactions on Engineering Management*, EM14:4-13, March 1967.

Evenson, Robert, "The Contribution of Agricultural Research to Production", *Journal of Farm Economics*, 49:1415-1425.

Fishel, W. L., "The Minnesota Agricultural Research Resource Allocation Information System and Experiment", paper read at the Minnesota symposium, February 23-25, 1969.

Griliches, Zvi, "Research Costs and Social Returns: Hybrid Corn and Related Innovations", *Journal of Political Economics*, 64:419-431, October 1958.

Griliches, Zvi, "Research Expenditures, Education and the Aggregate Agricultural Production Function", *American Economic Review*, 54:961-974, December 1964.

Meyer, J. H., "The California Academic—Responsive Budget System", paper read at the Minnesota symposium, February 23-25, 1969.

Paulsen, Arnold, and Donald R. Kaldor, "Evaluation and Planning of Research in the Experiment Station", *American Journal of Agricultural Economics*, 50:1149-1161, December 1968.

Peterson, W. L., "Returns to Poultry Research in the United States", *Journal of Farm Economics*, Vol. 49, August 1967.

Schultz, T. W., "The Allocation of Resources to Research", University of Chicago, Department of Economics, *Agricultural Economic Paper*, 68:16, December 20, 1968.

Seckler, D. W., and A. Schmitz, "Mechanised Agriculture and Social Welfare: The Case of the Tomato Harvester", *American Journal of Agricultural Economics*, 52:569-577, November 1970.

- Hirschleifer, J., "On the Theory of Optimal Investment Decisions", *J. Pol. Econ.*, 66:329-352, August 1958.
- Isaacs, —, "Sensitivity of Decisions to Probability Estimation Errors", *Ops. Res.*, 11:536-552, July-August 1963.
- Krutilla, J. V., "Welfare Aspects of Benefit-Cost Analysis", *J. Pol. Econ.*, 69-226-235, June 1961.
- Lawrence, J. R., "Evaluating Research", *Mgmt. Decision*, 2: 244-248, Winter 1968.
- McLoughlin, W. G., "The Case for Research Accountability", *Am. Mgmt. Assoc'n. Mgmt. Bull.* 98, 1967.
- Marschak, T., T. K. Glennan, Jr., and R. Summers, "Strategy for R&D: Studies in the Microeconomics of Development", New York: Springer-Verlag New York, Inc., 1967.
- Martino, J. P., "The Use of Technological Forecasts for Planning Research", in J. R. Bright (ed) *op. cit.*, pp. 265-276, 1968.
- Moore, J. R., Jr., and N. R. Baker, "An Analytical Approach to Scoring Model Design: Application to Research and Development Project Selection", *IEEE Trans. Engng. Mgmt.*, EM-16:90-98, August 1969.
- Moore, J. R., Jr., and N. R. Baker, "Computational Analysis of Scoring Models for R&D Selection", *Mgmt. Sci.*, 16: B212-B232, December 1969.
- Mottley, C. M., and R. D. Newton, "The Selection of Projects for Industrial Research", *Ops. Res.*, 7:740-751, November-December 1959.
- Nelson, R. R., "The Simple Economics of Basic Scientific Research", *J. Pol. Econ.* 67:297-306, June 1959.
- Pappas, G. F., and D. D. McLaren, "An Approach to Research Planning", *Chem. Engng. Prog.*, 57:65-69, May 1961.
- Pearson, A. W., and A. S. Topalian, "Project Evaluation in Research and Development", *Mgmt. Decision* 3:26-29, Autumn 1969.
- Peterson, W. L., "The Returns to Investment in Agricultural Research in the United States", Staff Paper P69-5, University of Minnesota, Department of Agricultural Economics.
- Prest, A. R., and R. Turvey, "Cost-Benefit Analysis: A Survey", *Econ. J.* 75:683-735, December 1965.
- Puterbaugh, H. L., "Discussion: Evaluation of Agricultural Research Productivity", *J. Farm Econ.*, 49:1439-1442, December 1967.
- Schultz, T. W., "The Allocation of Resources to Research", University of Chicago, Department of Econ. Agric., *Econ. Paper* 68-16, December 20, 1968.

CONTRACTING POTATOES

"Contracting is a means of coordinating production with marketing . . .". A contract commits both producer and processor to following specific procedures, at specific times, for a specific price.

"A collective approach to bargaining by producers would seem to be in their best interests."

"Because of inherent conflicts of interest, . . . there is a role for third party participation in the administration of marketing contracts."



*Don Kidd**

INTRODUCTION

The use of marketing contracts between producers and processors to co-ordinate production and supply with processing schedules is a well established arrangement in agri-business. In the fruit and vegetable processing industry, most produce is procured by processors under the terms and conditions of pre-arranged marketing agreements with producers.

The legal point to remember about a contract is that it is a binding agreement between the parties, and is not just an understanding, or so-called gentleman's agreement. Contracts are valid whether they are made verbally or on paper, but the advantage of the written agreement is that it is less subject to misunderstanding than the verbal contract. Since the terms and conditions of potato marketing contracts are rather complicated, written agreements are preferable to verbal arrangements in most cases.

The specific features of a potato marketing contract such as the cultural, harvesting and storage practices to be undertaken by the producer, weight and grade determination, and price settlement are referred to as the terms and conditions of the agreement. They are the subject of negotiations during the bargaining stage of contracting. If contract arrangements are to prove satisfactory in the potato processing industry, it would help to understand the difficulties that have arisen with contracts in other areas where they are frequently used.

This article is based on a speech given by the author at a meeting of potato industry people in Fredericton, N.B. on February 25, 1971.

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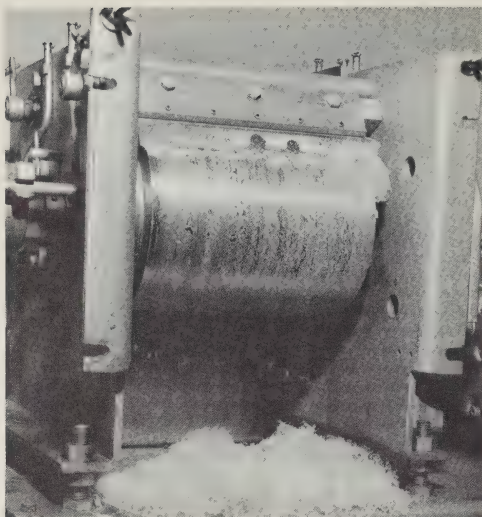
EXTENT OF CONTRACTING

In the United States, freezing plant operators obtained about 75 percent of their requirements for fruit and vegetables under contracts with producers in 1964.¹ About nine percent was produced on company farms, and only 16 percent was bought in the open market. In the Pacific Regions of the United States, which is an area of dominant vegetable processing, and in the Northwest Regions, about 93 and 86 percent respectively of procurement was under contract arrangements. Unfortunately, I do not have similar statistics of the situation in Canada, but I understand that contract arrangements are the predominant method of procurement in Canada as well.

Why this arrangement? Aside from a means of assuring supplies to satisfy plant processing schedules, contracting also permits greater control of quality in the produce and of the cost of the produce. However, the arrangement has not worked perfectly according to the experience of freezing plant operators in the U.S.

About 35 percent of freezer operators reported some difficulties with their existing arrangements, and the most frequently noted complaint was that they had no means of insuring compliance with the contract terms. They indicated that when fresh market prices were high, growers tended to sell in that market, and even though quality specifications were explicitly stated in the contract terms, growers could not always be dependent on to meet them.

¹National Commission on Food Marketing, *Organization and Competition in the Fruit and Vegetable Industry*, Technical Study No. 4, Washington, D.C., June 1966, p. 225.



Throughout Canada, the degree of competition from alternative market outlets would vary with the number of outlets in each area. Potato processors in Central Canada could expect more problems with assured delivery than in New Brunswick, for example. The second problem, the quality problem, could be partly solved with better extension services to the producers, either from the processor, the government, or better still, a combination of field services from both industry and government working together. Although it was not explicitly stated in the U.S. report, freezers also encountered fewer problems whenever they could obtain their requirements from relatively few, but large producers. On the other hand, freezers would not wish to become dependent on too few producers either.

Contract Characteristics

Potato marketing contracts cover a number of areas, of which the major ones are:

- (1) Varieties to be planted
- (2) Acreage to be planted
- (3) Planting and harvesting dates
- (4) Harvesting and storage methods
- (5) Minimum quality specifications
- (6) Month of delivery to plant
- (7) Method of weight and grade determination
- (8) Method of price settlement, including schedules of monthly prices and bonuses for above average grades.

Minor areas covered by contracts are:

- (9) Cultural practices with respect to use of seed, fertilizers and other chemicals
- (10) Supply of credit by processor
- (11) Field services by processor.

The Bargaining Process

Contractual arrangements between producers and processors may be negotiated on either an individual, or on a collective basis. This might be a controversial area, and which approach is more desirable from an industry point of view is a moot question.

Because of the lack of bargaining strength of individual growers, a collective approach to bargaining by producers would seem to be in their best interests. However, the experience with collective bargaining in Ontario under the Vegetable Growers Marketing Board was alleged to have raised prices to processors to such an extent that it encouraged processors to integrate into production, according to a study by Ontario Food Council². The competitive position of their products in domestic and export markets was adversely affected as a result of poor decisions by the grower controlled Board. Unsatisfactory performance by marketing boards has not been confined to vegetable growers. There is no easy solution to this complex problem, but we may expect that recognition of the mutual interests of growers, processors and governments in a viable potato industry will develop a workable collective bargaining process and administrative procedure in this area of marketing.

THIRD PARTY PARTICIPATION

Because of inherent conflicts of interest in some areas of contracting between producers and processors, I suggest there is a role for third-party participation in the administration of marketing contracts. This appears most relevant in the area of (1) weight and grade determination, (2) marketing information, and (3) farm marketing legislation.

It appears practical that producers and processors should agree to third party supervision of both weighing and grading procedures at the time of delivery of potatoes to the plant. As I do not have any experience in this area, I will leave it to product specialists to work out the details. It is suggested, however, that these services could be provided by either the provincial departments of agriculture or

²Ontario Food Council, *A Study of the Ontario Onion Industry with Special Reference to Marketing*, 1969-70, Toronto, p. 35.

by the Canada Department of Agriculture. When plant employed personnel are engaged in this procedure, they should be subject to testing and approval by the appropriate Department of Agriculture. If a lab test for frying quality has been accepted as a grading factor, the lab technician who makes this determination should be subject to regulations that will permit him to be impartial and objective.

Value Determination

Since processors require that a minimum percentage of tubers within a lot be within specified size limits



and relatively free of bruising and other defects, it follows that growers of above average quality potatoes should receive a premium above the basic price. Similarly, contracts should compensate growers for storage costs and shrinkage losses by an appropriate escalation of the basic price during the processing season.

More effective utilization of some varieties, such as Gems, can be achieved by integrating fresh marketing and processing to some extent. Since there is usually a good market for count boxes in the restaurant and retail trade, processors should have the option of utilizing the potatoes as they so determine. From the point of view of effective marketing, an integrated processing and fresh marketing operation has some advantage compared with a straight processing operation.

Markets Information

The deal to be made between processor and producers must be related to the marketability and gross returns from the sale of previous crops. In this respect, processors have better information than have producers. Processors are familiar with rates of sale, inventory levels, selling prices, and with costs at all levels of the operation. Although producers are not entirely in the dark, they need an organization to assemble and interpret the available industry data in order to reach a sound bargaining position.

Governments have a responsibility to the potato industry and to Canadian agriculture to collect, organize and present relevant information on the industry. Where vital information is not available, an industry organization can implement procedures to get the information that is necessary.

Marketing Legislation

Even though contracting is a means of coordinating production with marketing, problems of excessive supplies do occur with processed products, as well as with fresh. These surplus situations are likely due to both a desire by growers to obtain contracts with processors and desires by processors to expand processing volumes and sales.

Marketing legislation has been enacted by all provinces and by the federal government to enable producers to implement supply management programs. In this connection, the Canadian dairy industry provides an example of a thorough going system of marketing quotas, restrictions of entry into milk production and a rigid system of price control at the producer level. Whether or not potato pro-

ducers in Canada will take a similar approach to marketing of potatoes for processing is a matter for their collective decisions.

In this regard, the federal government has introduced a new marketing bill called the Farm Products Marketing Agencies Act, which if enacted, would provide the legal framework for the formation of national Farm Product Marketing Agencies. Under the proposed federal marketing law, and in combinations with provincial law, producers could develop a national marketing plan or program for

submission to and approval by the Ministers of Agriculture. The federal bill also provides for a Farm Products Marketing Council having investigative and advisory responsibilities to Ministers.

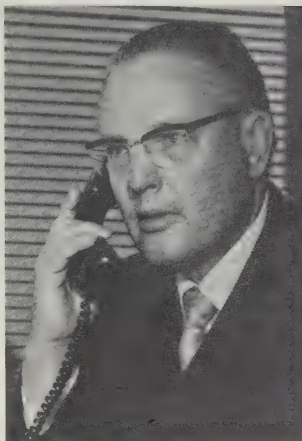
List of References

1. Roy, Ewell Paul, *Collective Bargaining in Agriculture*, Danville, Illinois, 1970.
2. Roy, Ewell Paul, *Contract Farming, U.S.A.*, Danville, Illinois, 1963.

RESOURCE MANAGEMENT MEMORANDUM

Technology has forced change upon the resource industries. As capital replaces labor, social problems arise. The division of authority is such that regional and local governments don't have the power or revenues to meet needs and conditions arising from national or international situations.

Thus, the central government is being forced to play a larger role in resource planning and management. Yet, in a country as diverse as Canada, the regional governments are closest to the needs of people. Unless, or until, the roles of the two levels of government are changed constitutionally, resource planning and management will be undertaken on a joint basis.



*Walter Burns**

The development and use of natural resources has been the basis of our complex industrialized society of today. The proper and efficient use of these resources has long been considered essential. To achieve this end, governments at all levels have placed great emphasis on policies and programs of assistance to those engaged in resource use. Out of these programs, a new technology has emerged. This has brought about a revolutionary change in resource management, particularly in reducing the labor required to achieve high levels of production. Indeed, these changes have come about so rapidly that it has not been within the capability of individuals to cope with the adjustments that have been forced upon them.

This tremendously expanded capability to produce, together with the changing demands of a "global village", has imposed the need for similarly revolutionary changes in resource use patterns. The development of the resource capability in some regions has contributed to the redundancy of the same resource in other regions. Transportation efficiencies have not only made long distance movement of goods and services possible, they have also changed the competitive relationships between regions for existing markets.

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PRESENT AND FUTURE TRENDS

A broad overview of the present situation of resource management makes it quite clear that advancing technology is causing a shift from labor intensive to capital intensive practices. Generally, as new technology is applied to resource use, and the harvest and/or extraction becomes more efficient, supply increases. This leads to increased use of the product as a result of lower prices. In the short run, there may be a partial displacement of a competing product. In the longer term, lower cost of natural products has led to a greater supply of consumer goods and services. Thus, through the rapid advance in resource use technology, today's society has achieved a comparatively high level of affluence. This has been accompanied by the development of the urban complex where the goods and services are produced most cheaply and in abundance.

Short term examination of the effects of new applied technology, frequently shows the first response to be over-supply of a given commodity. Perhaps a recent example is that of the surplus of pulp and paper in North America during the late 1960's. Over the longer period, however, economic and social adjustments created a shift in demand which have gradually offset the initial response and the new supply is absorbed. In the case of forestry and mining, the management method tends to permit close regulation of supply. The resources are held and used in large units and supply is usually related to demand potential and growth. This results in a minimum of over-supply at any one time.

In fisheries and agriculture, management is still entrusted to large numbers of people. Refined adjustment of the supply-demand situation has not been possible. Further, the impact of the forces of nature can be so variable that over or under-supply at any time may result regardless of management. The social impact of the problems arising therefrom in the short run may well exceed the economic advantage of a given change in technology.

Trends for the future of resource management show no appreciable change from those of the present day. The technology of resource use will continue to advance. New methods, new products and new machines may be expected to lead to ever increasing production, at lower and lower comparative cost. Such development will cause the continuance of the shift from labor intensive to capital intensive methods. Changes in the labor requirements of resource industries will continue to force social adjustments. During the past decade, technology brought about the need for social changes faster than people were able to adjust. This will continue for some time, necessitating a continuance and improvement of programs aiding adjustment.



There will be variations in these problems. The nature of the resource, the number of people involved, the relative state of the technology and many other factors exert an influence. The specific problems of each resource are identified in the following sections in the particular relationship of regional economic development and social adjustment.

Agriculture

Historically, Canadian agriculture has produced an exportable surplus. Small grains, chiefly wheat, have been the main products. Many other food products

have been produced at the level necessary to supply domestic demand with only occasional surpluses developing. Meat and animal products, poultry products and potatoes dominate this group. An exception is found in dairy products where the capacity to produce has in recent years, resulted in a continuing supply for export. A further exception is fruit and vegetables for which the Canadian climate is unsuited, or naturally disadvantaged.

It is of interest that during the early 1900's, Canadian agricultural research placed great emphasis on the broadening of the range of adapted food crops with considerable success. However, improved transportation has contributed to the natural advantage of more favorable climates, resulting in a decline in Canadian production. Lettuce, cabbage and other cole crops, root vegetables, soft fruit, small fruit and nuts are the major examples of this group of crops.

At the present time, Canadian agriculture is under pressure from a large surplus of wheat and other small grains, and milk. Traditional markets for wheat and processed milk products have remained constant or contracted while production was undergoing rapid increase. New markets to absorb the new production on a sustained annual basis have not developed. This situation has been building up for years. However, the magnitude of the problem looms much larger than ever before. It is the result of the introduction and adoption of new management techniques and practices, interrelated with a failure to make social and economic adjustments.

Canada identifies 174 million acres of land as in agricultural use and 108 million acres are cultivated for crop production. There were 432,000 farmers in 1966, as determined by the interim Census. This land and these farms produced an estimated product value of 4.2 billion dollars. Perhaps of greater significance is that 25 percent of the farmers used 65 percent of the land and produced 75 percent of the products. These farmers have adopted a high degree of the modern techniques of food production. On the remaining 75 percent of farms, a high degree of the old labor intensive methodology is employed. These farmers, part-time farmers excluded, expect to earn their livelihoods from the food they produce and to have it priced accordingly.

Thus, pricing of products to maintain adequate income to the inefficient results in the efficient becoming affluent. Conversely, reasonable returns to the efficient brings hardship to the inefficient. Agricultural pricing policies have attempted to follow a

middle of the road approach. Reasonable as this may be in a social context, it has resulted in pricing our supplies out of world markets. For example, much is made of the decline in international trade in wheat during the past year. Though the actual trade declined by 19 percent, Canada's share declined by 50 percent. In addition, there was a rise in the trade of other lower cost competitive energy foods. The reaction of wheat importing countries to a lowered price through 1970, is strong evidence that the asking price for wheat was too high.

In the case of milk and milk products, other factors are involved. Many other countries in the world are producing large surpluses at subsidized prices. The grand total of surplus is such that even at very low prices, the world market is saturated. Thus, we may have an example of global over-production at this time.

Trends for the future of agriculture have been determined. Projecting from 1956, there will be 315,000 farms in Canada in 1981. Projecting from 1961-66, during which the decline was faster, less than 300,000 farms will exist in 1981.

Careful analysis of the income requirements of a farm unit indicates that the present product value could support 150,000 efficient farm operators. This is one-third the present number. New techniques may further reduce this number by 1981. Thus, the social and adjustment problem today in agriculture can be expected to continue to 1981 and beyond, unless national policies and programs can be developed to double the rate of social change in agriculture.

Concern is frequently expressed that the production capacity of Canadian agriculture has become too large. The evidence for such concern is not conclusive when weighed against both the gross inefficiencies found in some enterprises and in some regions, and in the price supports and subsidies existing. However, there is proper concern for the amount of low capability land under modern techniques that is now being retained in Canadian agriculture. Such land, unsuited to modern farm practice should be rapidly phased out of agricultural use. However, recent trends have shown a small increase of such land in agriculture. In the future, this trend must not only be reversed, but the rate of removal must coincide with the rate of the related social adjustment. The Canada Land Inventory provides a most useful tool to achieve these objectives. A large number of other policies including crop insurance, grain delivery quotas, crop failure assistance



and feed freight assistance must be altered so that operators of farms are discouraged from keeping low capability land in agriculture.

Fisheries

Canadian fisheries annually harvest a large exportable surplus of fish products. At present, the industry is slowly emerging from a marketing crisis brought about by major shifts in international trade and a decline in domestic consumption. The United States market was invaded by supplies from European countries at prices below the Canadian cost of production. As a result, returns to Canadian producers are so low that they cannot afford the changes needed to become competitive. In consequence, the trend to adoption of new techniques has been exceedingly slow. Practices such as

1. industrial research in harvesting and processing technology to derive new products and processes;
2. employment of top management specialists;
3. promotion of products to ease marketing and to increase consumption;
4. capital investment in diversified production (catching boats and gear, processing machinery, preserving equipment, distributing equipment, opening new markets, etc.);

have not been widely undertaken. A global trend in diverting fish products to industrial usage, with a lower return and requirement of manpower, has further reduced fisheries income.

As a result of licensing restrictions, there is a slow, but discernible reduction in the number of inshore

fishermen. There is not a similar increase in the number of offshore fishermen.

Some progress has been made in adjusting the infrastructure of harbour, pier and transport facilities for fishermen. Again, the changes and improvements are inadequate. There is a clearly defined need for centralized landing, processing, handling and marketing facilities.

Despite the apparent urgency for massive adjustments, particularly on the Atlantic coast, the immediate future holds only slow changes. Income in fishing will remain below the Canadian average and there will be only a slow movement of people from the industry.

Forestry

Forestry, like agriculture and fisheries, deals with a renewable resource. In forestry, however, a long period of time is required to produce a crop that is useful and marketable. This time element introduces uncertainty concerning the future value of the crop. Large areas are necessary to achieve economy of scale and a desirable return. Fortunately, if the market structure or demand changes the crop can often find other uses or it can be held until the market improves.

Our present area of productive forests is 614 million acres of which about 82 percent is Crown Land under provincial jurisdiction. The remaining 18 percent is private woodlots, company freeholds, military areas, parks and territories under federal jurisdiction. The total volume of growing stock is estimated to be about 750 billion cubic feet of which about 3.7 billion is cut annually. The annual value of the Canadian wood product exports is \$2.3 billion.

Most of the timber is used for wood products which are sold on the world market. The present export prospects are bright. Thus, it is estimated that the world market will annually require at least one-third more industrial wood by the end of the next fifteen-year period. A major portion of the exports from Canada will be lumber, chemical pulp, newsprint, plywood and pulpwood for north-western Europe, the largest market. The second largest market for wood products, perhaps the most important one for Canada, is the U.S. — about 10 percent of the supply, or 1.7 billion cubic feet. Japan, the third largest market, is expected to import about 38 percent of her supply (equivalent to 1.0 billion cubic feet) in 1975.

Accepting a five percent annual growth rate for the pulp and paper demands for the last 25 years of this century, and adding the demands for lumber and plywood, we obtain a total demand in the year 2000 of four times the demand in 1966.

Rational forest management practices would concentrate management to the most productive land. This reduced area, combined with the submarginal agricultural land released by farm adjustment programs, could easily produce a timber crop that will equal the present annual cut.

It is clear that with our present methods, Canada will not have enough wood in 2000 to meet the estimated demand. The old affluent days of inexhaustible forest resources are nearly over.

At the national forestry conference in 1966, it was stated that Canada will fail to maintain her share in the supply of wood products that will be required in 1975 — only four years hence! This situation will be costly to Canada if other countries are prepared to capitalize on our situation. Still, since the national forestry conference was concluded not much has been done to improve our long term chances to compete in the world market.

The normal rivalry between companies is second only to a rivalry between the provinces who want to see their forest resources “developed”. The competition for grants and loans has shown a certain disrespect for proper timing and economic soundness. Grants are made only on condition that construction start immediately and the development is pushed by loans, attractive tax concessions and outright subsidies. This individualistic approach to resource development leads to recurrent over-capacity with adverse effects on the security of labor and on tax revenues. To avoid this situation in the future, industrialization must be carried on by a mature flexible cooperation and sharing of responsibilities between governments and industries rather than by the present immature rigid protection of federal or provincial rights.

There is evidence that investments in forestry and forest industries can yield good returns. The maximum benefit will be derived from land management when human, natural and capital resources are combined at an optimum. The segregation of land for industrial timber production on the basis of strict economic criteria will release from forestry such land that cannot pay for normal costs of administration. This land can then be set aside for other uses, e.g.,

water control and regulation, wildlife, parks and recreation. When the capability of land is known for various uses, economic analyses will determine the use that should have preference. A management plan will then define the practices that will produce the highest return and the number of workers that can be continuously employed in various operations.

The exploitation of virgin timber generated capital for industrial expansion and the creation of a modern society. After the initial natural preoccupation with disposal of virgin timber, forest resource management is slowly coming of age. Still, timber disposal is practiced with various tenure systems under the disguise of such terms as sustained yield and allowable cut. It is only very recent that some provincial governments have started to practice sustained forestry by means of the correct method of area allotment. Progress from a wild chase for the most valuable stands of timber to orderly land management has been retarded by traditionalism and inefficient research. Thus, the abused selection system is maintained by separate licensing of small sawmill operators and in some provinces, it is still advocated by some scientists as a suitable silvicultural method.

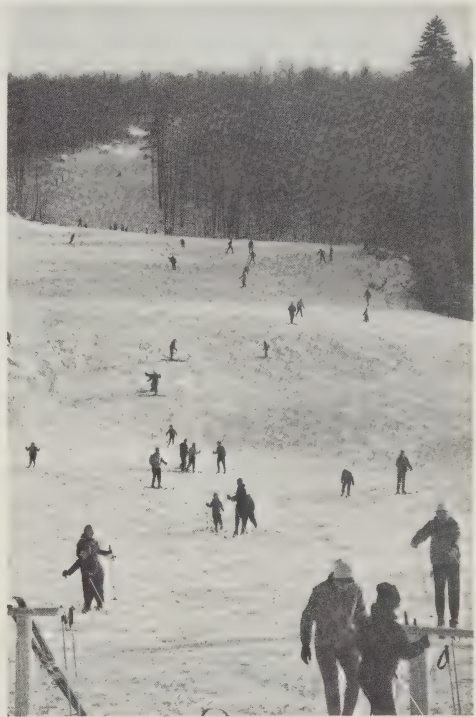
New equipment is continuously being designed to brake the rise in wood costs. This sophisticated and expensive equipment requires more skilled labor for its operation, but will reduce the labor input per unit of wood by about 75 percent. The new machinery will require large volumes per acre for its economic operation. To be useful in woodlot management, therefore, the new machine systems will require extensive consolidation of the woodlots into larger management blocks.

Although the modern machinery has made transport possible without extensive road building, a basic system of roads will always be needed for general access, fire protection, supervision and for improved mobility of the modern equipment. Such a basic road system, increasingly accepted as a long term investment, must be combined with the public road system to provide low cost transportation of round timber or wood chips.

The present systems of tenure often hamper an efficient operation and need to be replaced with systems of long-term rental. It is generally accepted that private enterprise can be more efficient in business operations than governments. The management of forest land for industrial purposes could therefore be entrusted to well established and reputable private enterprises. This will secure conti-

nity and efficiency on the basis of a genuine interest of private enterprise to stay in business. It makes sense to create possibilities for a striving private business since good management will lead to industrial expansion and economic growth. This approach would ease the administrative burden on the provincial governments.

The antagonism between classical forest management and industrial exploitation has gradually decreased to give way to a better understanding of forestry as a whole process. This process includes



the technical, social and economic aspects of forestry, as well as the manufacture of the end product. There is also a growing consciousness of increasing pressure on forestry for social services such as water control and regulation, soil conservation, wildlife and recreation.

Although private property and rights outside of government jurisdiction are involved, the great production potential and the social importance of woodlots must be utilized. The occurrence of large areas of small woodlots in Quebec, New Brunswick and

Nova Scotia coincides with areas which are economically depressed. Although the woodlots are located on the best land and at short, short distances from mills, they are too small for efficient forest management. Returns to owners are insufficient to substantially improve the owners' standard of living. The employment of woodlots for industrial forestry, through the introduction of national practices, could immediately provide a drastic and lasting improvement of the local and regional economies.

Mining

Mining in Canada is developing and expanding in response to increased demand for a wide range of mineral products. At the time, there is increasing change in the industry resulting from closure of operations due to exhaustion of the resource and a decline in demand. Thus, in Canada the normal cycle in extractive industry of discovery, development, production, decline and adjustment is now in full operation, even though the rate of development greatly exceeds the rate of closure.

The nature of mining management is such that the supply may be closely assessed in relation to demand. This in turn is very closely tied to the economics of production. Thus, while exploration and development tend to be continuous, extraction in any particular mine is responsive to price or production changes at other mines.

The techniques of mining continue to be improved. Mining operations are becoming highly mechanized, increasing the efficiency of extraction, both in economic and physical terms. The need for large blocks of labor and the attendant infrastructure to support them is relieved. However, in old established operations, there has been a release of workers who have few alternate opportunities. This social problem is quite clear in a number of areas at the present time. Some of the factors that have caused mining communities to become "slow growth" areas with attendant social problems are:

1. the reduction in number of workers required in a mining operation due to improved techniques and the lack of alternate opportunity;
2. depletion of the mineral resource and slowing down of production;
3. adverse shift in demand for certain mineral products;
4. lack of opportunity and failure to develop complementary processing and smelting opera-

tions, and secondary industries to stimulate the development of a viable self-sustaining economic community providing a wide range of goods and services;

5. environmental deterioration.

This pattern of development in the mining industry creates problems of unemployment, social security and income maintenance — all of which fall within the responsibility of the federal government. This authority tends to enter the mining scene at a time when the mines and related communities are in trouble due to depletion. In the past, provincial governments have been more concerned with the immediate development of a mineral resource and not enough attention was paid to the hinterland of the mine or to what provisions were made for the future of the mining community. The provincial governments exercise jurisdiction at a time when the mines are on the upswing. At this time, there may be no conflict of interest with federal policies or no call on federal resources.

The trend in Canadian mining for the foreseeable future may be expected to follow a development-expansion pattern. The need for new supplies will rise in response to both (a) the need of a rapidly increasing population, and (b) the gradual depletion of existing sources. Canada has large — and as yet not readily accessible — areas, partially explored and mainly undeveloped. The development of new techniques of transportation, will bring remote areas within reach. New techniques in housing and other needs and comforts of participants will be applied. New techniques of mining which will reduce the manpower requirements, increase the efficiency of operation and cope with the problem of adverse climate will be found. All these appear to be well within present day capability. The development and application of capital will occur as demand and economies of production warrant. Despite these factors, development of northern mining areas should be related to the well being of local people.

At the other end of the process, in the future, there will be an increase in the number of operations showing decline and closure due to exhaustion. This will give rise to a number of problems which will accrue to governments. These problems will range from retraining, relocation, rehabilitation and the whole gamut of welfare, to broader adjustments within and out of a declining economic region.

It is in the nature and location of many such communities that they will not survive following the loss

of the activity which created them. Others may find a new future in expanded industrial activity. Within the limits of present management, regardless of the outcome, governments at all levels will be called upon to support this social adjustment.

Recreation and Tourism

Canada's outdoor recreation resource base is exceedingly rich, varied and extensive, and, in spite of a rapid rate of deterioration, is still largely unspoiled. However, the supply of resources readily accessible to major urban populations is now totally inadequate in many instances, in both quality and quantity.

The recreation-tourism industry does not readily lend itself to any simple measurement of growth, nor did measurement problems receive much attention until quite recently. However, such indicators as inter-provincial and international recreation travel, employment in leisure time service and supply industries, recorded attendance at public recreation areas, and related public and private investment evidence exceptionally rapid growth in the past fifteen years.

Disparities are evident however, in the distribution of benefits from this growth. Various recent surveys indicate that resource based recreation and vacations involving travel are enjoyed primarily by upper income, urban families. It is assumed that lower income groups have the same needs, but do not participate because they cannot afford it. The growing deterioration of the urban environment, which is particularly felt by low income groups, can only aggravate these needs.

The economics of outdoor recreation resources is significant regarding (a) the nation's balance of payments, (b) the level and distribution of domestic travel and recreation expenditures, (c) the relative attractiveness of any particular locality as a place to live and work, and (d) local and regional employment and investment opportunities.

The demand and supply trends are readily interpreted into economic terms: the continuing deficit in Canada's international travel trade; increasing investment; generally low returns to both capital and labor where short seasons of use are imposed; a booming equipment manufacturing industry; increasing pressure on resources at the risk of losses to other primary industry; increasing costs in the public sector for reclaiming key resources; and the increasing importance of natural environment and out-

door recreation as factors in new secondary industry location.

Technological implications are varied. Technical improvement in recreation equipment is progressing very rapidly. Remember the equipment of fifteen years ago for pleasure boating, skiing, camping and winter travel. In Canada, man's capacity to destroy basic land and water resources continues to grow more rapidly than institutional ability to control and manage these resources.

The Canada Land Inventory and techniques currently developing in the U.S. and Canada help us to understand demand trends and are advancing Canada's planning competence very rapidly. But the entrenchment of traditional resource practices severely limits the application of present technology, and will limit the use of future technology.

Outdoor recreation is a social phenomenon of our time. We know little about the basic need of an increasingly urban society for outdoor recreation, but we are familiar with the demands which reflect it. Many of these demands have social implications. Increasing deterioration of the urban environment, increasing influence of urban society through the ballot box, increasing week-end travel congestion, increasing tendency of Canadians for foreign travel, growing number of urban Canadians who are unable to enjoy recreation involving travel, and growing concern for environmental quality, are only some of the trends which give social impact to resource use decisions. With steadily improving travel facilities, Canada's natural attributes can attract rapidly increasing numbers of both U.S. and overseas visitors. The international package tour industry is likely to increase in importance.



As Canada's rural people continue to move to the cities, their mobility, affluence and leisure time will increase while the quality of the urban environment deteriorates. This combination ensures a steady increase in the demands on outdoor recreation resources.

The supply prospects are much less clear. Increasing public pressures will move governments to favor social needs in the allocation of public resources. However, should capital remain scarce and urban problems intensify, non-urban public recreation development may lose the priority position it enjoyed in the 60's. Perhaps though, we will not be so short-sighted that we discontinue the fight against pollution.

The present modest trend toward longer seasons for tourism, will continue, but the sharp summer peaking and extreme off-season lows will remain a serious impediment to full development of the industry in most parts of Canada.

High interest rates tend to dampen private investment in outdoor recreation, particularly in high risk rural areas. The present scarcity of recreation services particularly food and accommodation, may become more acute, and tend to restrict the travel and employment potential of the recreation industry.

International competition for foreign recreation travel will remain keen, with strong support from national governments in all three of the traditional areas of government involvement—promotion, development and regulation. Historical, cultural and natural resources will continue to be the primary travel generators, though the present trend to development of a wide range of recreation opportunities will continue.

IMPACT OF TRENDS ON THE ROLE OF THE PUBLIC SECTOR

Agriculture

The public sector will continue to play a major role in Canadian agriculture. Present attempts at the international level to determine and collate world food production and distribution into logical patterns must continue. Evidence of a food shortage for the majority of the world's population is on every hand. Canada, together with other nations, can and should continue to work toward the solution of this problem. Implicitly involved is the welfare of Cana-

dian producers. The millions of people in undeveloped countries, who are only now becoming aware of the tremendous capability of technology, are, of course, directly involved.

At the national level, the public sector must address itself to many problems in agriculture. Many problems will relate to the comparative advantages of various regions to produce agricultural products. Social problems will result from the shift in competitive advantage from one region to another. Because the agricultural problem derives largely from the failure of people to adjust, solutions are to be found first in massive out-migration. This can not take place without some better place for these people to go. The nature of the solution is such that it will be dealt with effectively only on an inter-regional basis, and as such, it will require national support. The many national policies provided to assist agricultural development and expansion must be reappraised and revised to coincide with the needs of tomorrow. This is a massive, difficult task, but it must be done.

The public sector at the provincial level will be faced with a major challenge as a result of agricultural trends. Perhaps the greatest challenge will be the demand on the provinces to provide the information, knowledge and understanding of the problem to people caught up in the change. Provinces must not only advance the science and technology of agricultural management to those who will be future food producers, they must also provide information, advice, direction and leadership to those whose future lies elsewhere. It is this level of government that is close to people and which deals with them as individuals. As such, the greatest sensitivity must be found in the provincial governments.

Trends in agriculture imply change for the public sector at the regional and local level. It is most obvious that as fewer people utilize larger land areas, the nature of the rural community, will change drastically. For example, the demand for more reliable and more efficient input services will result in inputs being handled in central places on large volume, efficient bases. The same will apply to product processing. Thus, the need for arterial service roads to service centres at greater distances will replace present local structures. Local governments must be led to react favourably to these changes and to develop a new concept and method for discharging their future function. Continued efforts of local governments to maintain themselves as in the past can only result in a disservice to the people who they might otherwise have served.

In summary, all governments will be affected by the impact of changes in agriculture. The degree will vary depending on the various responsibilities and capabilities of governments. Perhaps the most difficult problem the public sector will face is the changes in its own structure which derive from the total change brought about by technology.

Fisheries

The magnitude of adjustments foreseen in fisheries resources and the short time over which this should take place suggest major involvement by the public sector. Responsibilities will accrue to governments at all levels to expedite adjustments and to alleviate hardships.

At the international level, Canada should continue to press for increasing recognition of the need for national control over the regulation of waters on which the fishing industry is based. Such control is clearly indicated by the development of fishing fleets which operate effectively over immense distances. This has made the fishing waters of the world accessible to all nations. Advanced knowledge of marine ecology gives further evidence of the need of such regulations. It is only when the extent of production can be determined in ongoing terms that objectives for total industry adjustment can be established. This includes the conflict between commercial and sport fishing in both international and national waters.

Further impact at the national level may be observed in the lack of financial capability to cope with the social adjustments foreseen in the Atlantic Region, where the problem is most acute. On the other hand, in many areas, provinces deal directly with people. These implications taken collectively suggest a joint responsibility on the part of both levels of government to develop an effective adjustment within the industry in the time available.

As with other resources with a major social involvement, regional and local governments will have a part to play. In addition to adjusting their own structures, these governments have a leadership role in the guiding and encouraging of people into new and better opportunities. They must not respond by maintaining traditional procedures and practices. Governments — at all levels, but particularly at the level closest to the people — must serve the needs of people. Governments should realize this and so should the people. As services to the industry become sophisticated and centralized, some small service

centres will disappear as the inhabitants are absorbed elsewhere. The need for local government will have disappeared and the structure with its attendant burdens should be terminated.

Forestry

The previous development of our forest resources occurred in leaps and bounds. The present and future trends point out the need for an adjustment and redistribution of our responsibilities with respect to forest resources. It is obvious that we have to change our method. We must make arrangements to keep pace with changes in our regional, national and international environment. The rehabilitation of our forest requires comprehensive and coordinated planning by all levels of government.

A constant exchange of information on the international market must be maintained by the federal and provincial departments to prevent loss of business opportunities and to guide the development of our resources to meet future needs. The alleviation of regional disparities is a task of national concern. Incentives to promote industrial expansion in designated areas will have a profound effect on the management of forest resources and hence on the continuity of the raw material supply. Introduction of sound business principles in forestry will immediately mean improved economic returns, higher tax revenues and, thus, greater opportunities for all levels of government to promote economic growth.

Mining

Continuing and increasing productivity from mining will contribute substantially to the wealth of the nation, and to national and provincial incomes. Many of the people associated with mining will prosper. In areas of declining productivity, there will be a magnification of social and economic problems.

In the interest of promoting economic stability, a future criterion in mineral resource development should be to promote a regional economic structure which has an appropriate mix of resources to promote self-sustained growth. This calls for cooperation and coordination of plans between the departments and agencies responsible for mineral resources of all levels of government.

In the absence of such coordination, governments would have to make ever increasing expenditures, even under present social programs, when mines decline or fail. Owing to the special nature of the

mining industry, closures can always be expected and high cost social aid expenditures will follow. Problems of economic and social adjustment in a failing mining community arise from the failure to make adequate provisions during the mine's productive years.

In order to provide for these eventual expenditures, it has been suggested that the corporations engaged in the exploitation of a mineral resource assume more corporate responsibility. This could be done by the establishment of a fund during the mine's development and/or production stages. As the mine declines, payment from the fund could be made to employees to assist them in finding employment, to provide supplementary assistance to present unemployment schemes or to assist in restructuring the mine site for an alternate use. Such a scheme could be a three-fold achievement. Firstly, it would alleviate the burden falling to the federal and provincial governments in the event of mine closures; secondly, the mine employees and community would have assurance of some form of security which would have a substantial effect on morale and possibly productivity; thirdly, it would allow for greater participation and understanding when problems arise in the industry.

The planning process will be faced with many problems. In some cases, it will be obvious that a particular community will exist only for the purpose and duration of the extraction of the mineral. Lack of advantage for other productive purposes can easily be determined at that time. It may be determined that another community has an opportunity to develop viable ongoing industries. Governments must be prepared to respond to these situations. Growth should be encouraged where the potential exists, adjustment should be built into situations lacking this potential.

At the regional and local level, a new problem may be identified. Mining has changed, and so should mining communities and their local governments. It will become essential for local government to be responsive to these changes and to develop an appropriate format of adjustment. Specifically, in a community which is declining and for which there is no alternative, ultimate phasing out is indicated. The local government must understand this problem and assist senior governments in an orderly closure and an alleviation of hardship. The role of local government in a growing community, though subject to improvement, is likely to be more readily understood and appreciated.

Recreation and Tourism

If Canada's recreation resources are to meet our varied and growing demands, increasing involvement of government at all levels is essential. The following implications are noted:

1. The traditional single use approach which permitted government to assign a large share of management responsibility to industry can no longer be allowed. The transition to integrated management is charged with conflict — conflict which only government can resolve.
2. Coordination problems are to be found among agencies at each level of government, as well as among levels, and among government and non-government agencies. Improved coordination of federal activities would enable provincial governments to meet their responsibilities.
3. Most public outdoor recreation areas are located at considerable distances from metropolitan areas. Outdoor recreation needs of lower income urban people can only be met by readily accessible day-use facilities, preferably within reach by public transport. This objective is beyond the scope of individual municipal governments because of high land costs, deteriorating land capability, and jurisdictional problems.
4. The urgent need for preservation of irreplaceable lands is evident on all sides. Long term trends in population growth and concentration warn of the dangers of inaction. The problem is felt most acutely at the local government level, but its solution is largely dependent on senior government assistance.
5. Short seasons of outdoor recreation activity constitute a major deterrent to development of recreation-related industry. These effects could be offset somewhat by an intergovernmental program to promote areas, develop new facilities and accommodation, and to grant special incentives to the private sector.

INTERRELATIONSHIPS OF GOVERNMENTS IN RESOURCE PROBLEMS

Changes in resource use and modern technology suggest changes in the roles assumed by governments. All levels will have responsibilities and hopefully the capabilities to discharge them. However, changes in the traditional divisions of responsibility are needed if resources are to be used efficiently.

Increased production of food, fibre and mineral has resulted in an ever enlarging supply — a supply often surplus to out national requirements. This surplus is available for trade with other countries. The regulation and control required can obviously be met most readily by the central government, which in turn is able to relate to the international situation. The increasing recognition of problems of regional disparity brought into focus the limitations of resources in supporting people. Correlating resource capability, use and management on an inter-regional basis requires the participation of the central government. Regional governments are too prone to develop resources within the restrictions of a regional economy. While acceptable in the past, the demand by users for equal participation in the benefits of national income makes this approach unsatisfactory for the future.

The problems of people who are directly dependent upon resources, must be met by governments which have a close contact with them. It is only through the existence of a personal relationship using "field offices" that governments develop a sensitivity to the needs of such people. In the past, this relationship has been held by regional and provincial governments. Limits in travel technology have allowed this situation to develop. These travel restrictions are now removed, and it is fully possible in Canada for a central government to develop personal contacts with resource users. Allocations of the responsibilities for the problems of people should be re-examined in this light. The requirements of people have changed. If all Canadians are to share equal opportunities for income, then surely the federal government must assume a strong planning and leadership role in achieving this objective.

Information Systems

Information systems tend to be expensive, high capacity, and complex. Because of their great capacity and accuracy, a single system is efficient and practical on a national basis.

The collection of data for an information system requires staff familiar with specific areas and regions. A complete, centrally controlled and operated system would then require field offices. The advantages of such a central system in achieving uniformity of resource information are obvious as compared to the extensive and repeated efforts required to develop a coordinated approach between numerous regional authorities.

Research

Research to serve resource use and management covers a very broad field. Implications are found for all levels of government as well as for individual users. There are also implications for the various producers of research.

In the past, the responsibility for research has fallen to the government with the capacity to carry out the work. In Canada, this has been mainly the central government.

Fundamental research will continue to have broad application. Results will require adaptation to a variety of locales. The complexity of research suggests a continuing central role to avoid duplication of effort. However, this need not be solely a participatory role in the future. Canada now has a number of very competent graduate schools which could be entrusted with a major portion of fundamental research. Thus, the central role may gradually be shifted from major participant to liaison and support services (to avoid overlap or duplication). Numerous benefits would arise. Opportunities for uncovering and training potential researchers would be greatly improved. Research work would not be subjected to the restrictive attitudes so commonly found within a centrally controlled government. The degree of regionalization in academic institutions would provide stronger support to the conduct of applied research.

In the application of science to resource management, two problems arise. First, there is the need to assure that such research progresses as required throughout all of Canada. Secondly, there is the importance of environmental differences among regions that must be studied. Thus, it is suggested that for the future, a role for regional responsibility should be examined. Perhaps the approach used in agriculture in the United States, through the system of land-grant colleges in which central and state governments work jointly, is worthy of examination in relation to Canada's needs.

Coordination and Consultation

All levels of government will have responsibilities to participate and to develop coordination in resource use and management. Regardless of the resource, development and exploitation can only be achieved with the application of the broadest knowledge of supply and demand, and competitive positions internationally, nationally, and regionally. Because of the increasing importance of international competition,

the central government will be called upon to fulfill a major coordinating role in the future. Regional governments will have a coordinating role at the regional level as well as a participant role in supporting coordination at the national level.

Planning and Development

Concern is frequently expressed for the lack of planning in the development of natural resources in the past. Resource exploitation was a major and urgent need in Canadian development. Information on the extent and capability of land and water was lacking. In consequence, planning was neglected. As difficulties arose provinces were unable to cope with the changes. In more recent years, changing technology has brought about a major shift in resource management. Again, provinces could not manage the required adjustments. It has fallen to the central government to support the adjustments and developments that the provincial governments could not handle.

Under these circumstances, it is essential that the central government have a major role in planning future resource use in Canada. Ideally, planning should be a joint activity between the resource users and people of responsibility in all levels of government. Nevertheless, major responsibility and authority for planning should be vested in that level of government which shoulders most of the burden for the well-being of the Canadian people.

Regulation

The regulatory function arises as a result of the need for uniformity of product and supply to satisfy the market. As the market area has grown wider and wider, the need for more national Canadian standards has developed. This has become a central government responsibility. The exception may be the

product which is clearly destined to be consumed within the province of manufacture and is produced nowhere else in Canada. Consequently, in the future, there will be a very minor role for other authority in product and productivity regulations.

Financing

Financing programs to deal with resource industry problems in Canada have traditionally fallen to the government with the capability to carry the load. This has applied to all resource industries. Central support has been given when a failure of the resource, has created hardship for relatively large numbers of people.

CONCLUSION

Normally, it may be argued that emergency situations warrant the application of the resources of the entire nation. On the other hand, there is also clear evidence that the level of government supporting the problems arising from (a) mismanagement of resources, (b) exhaustion of resources, (c) changing technology of resource use, should also participate in the planning, regulation and coordination of the exploitation and production stages. Perhaps this is merely saying "he who pays the piper calls the tune". Nevertheless, since central authority is faced with the cost of dealing with resource industry crises, it could be argued that the total management of resources should revert to that level of government. Further support for this thought may be found in the ever increasing impact of national and international factors on the efficiency and competitiveness of resource use, requiring more sensitive regulation and planning. Since this is not likely to occur in the foreseeable future, it is suggested that joint responsibility with joint planning become a major feature of governmental relationships in coming to grips with the problems of resource adjustment and management.

BASIC PARAMETERS OF THE PRIMARY DAIRY INDUSTRY IN ONTARIO AND QUEBEC: PART II

In Ontario and Quebec in 1966, manufacturing milk shippers had more off-farm income and lower expenses than fluid milk shippers. However, they had fewer cows, smaller farms and lower sales volumes than fluid milk shippers. Since 1966, both manufacturing and fluid milk shippers have increased their herd sizes and sales volumes, but the sales volume difference has widened. Changes in marketing and further off-farm employment for manufacturing milk shippers are possibilities for narrowing the income gap.



*I. F. Furniss**

INTRODUCTION

This article is the second in a two-part series which attempts to characterize the basic parameters (dimensions) of the primary dairy industry in Ontario and Quebec. The first of these articles presented a structural and spatial analysis of the industry¹. Generally, the study indicated that the dairy enterprise in Ontario and Quebec was an industry of relatively small operations. In Ontario, the average

herd was about 29 cows and 70 percent of all herds had less than 33 cows². In Quebec, the average herd was somewhat smaller, at about 24 cows, and 82 percent of all herds were 33 cows or less.

Important regional differences in the primary dairy industry were also identified. For example, dairy farms in the Eastern and Northern Ontario Regions had more characteristics in common with dairy farms in Quebec in 1966 than they did with dairy farms in other regions of Ontario. The regional differences supported the conclusion that the limited alternatives to dairy farming in most of Quebec, Eastern and Northern Ontario were the most inhibitory factors to adjustment to technological and market changes.

Objectives and Scope

The first article in this series dealt with "dairy farms" as a whole in the sense that they were not separated according to major market outlet³. In this second article, the purpose will be to characterize some of the parameters specific to fluid milk farms and to manufacturing milk farms, separately, for Ontario and Quebec dairy census-farms. The data employed in the analysis again come largely from the 1966 census for farms classified as "dairy-type"⁴. However, instead of a sub-classification of these farms by herd size within regions, a small-area tabulation by township for selected county(s) within each specified region is the basis for analysis⁵.

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¹I. F. Furniss, "Basic Parameters of the Primary Dairy Industry in Ontario and Quebec, *Canadian Farm Economics*, Vol. 5, No. 4, Oct. 1970, pp. 11-24. This article will be referred to as "Part I" of the study report.

²The word "cows" refers to the census count of all cows and heifers, two years old and over, on census dairy farms at June 1, 1966, unless otherwise specified.

³The terms "manufacturing milk" and "industrial milk" are used synonymously. "Manufacturing milk" will include "cheese milk" and also milk or cream sold for manufacture into butter and any dairy products, other than milk, sold to consumers as fluid milk or cream.

⁴These data refer to agricultural holdings as defined for census purposes having sales of \$2,500 and over in the 12-month period prior to the census at June 1 (or even the previous calendar year). In order to qualify as a dairy census-farm, 51 percent or more of the total sales of agricultural products had to be obtained from the sales of dairy products, or 40 to 50.9 percent obtained from dairy products provided that the sale of dairy products together with the sales of cattle and calves amounted to 51 percent or more of total sales of agricultural commodities.

⁵The regions specified correspond to those outlined in Part I of the study and described in Figures 1 and 2 and Footnotes ⁸ and ⁹ of that article.

Method of Analysis

The 1966 census did not provide any specific means of identifying a predominantly fluid-milk producer-shipper from the predominantly manufacturing-milk producer-shipper. Furthermore, since there were a relatively small number of census-farms of a given product-type within a small area such as a township (sometimes less than three farms), each township was analyzed as "one-big-farm". This procedure implied an assumption that the township per-farm average reflected the parameters of the predominant sub-type of dairy census-farms contained within its boundaries.

The determination of whether a township was one largely of fluid milk shippers or of manufacturing milk shippers, therefore, had to be based on *a priori* information about the significant characteristics of the two sub-types of dairy farms. There are two important parameters which characterize a dairy farm as to its major market outlet. One is "value of sales per cow". This parameter reflects both product price and production per cow. Available evidence is that value of sales per cow is consistently less for manufacturing milk farms than for fluid milk farms (see Tables 12 and 14). This is due largely to lower average product prices since production per cow is not consistently lower, although there is a tendency for this to occur also. Furthermore, manufacturing milk herds tend to be smaller in size than fluid milk herds so that when combined with a lower average product price, sales per herd for manufacturing milk herds average less than for fluid milk herds. These relationships are, on average, almost invariable for any region or herd size.

A second basis for distinguishing fluid milk shippers from manufacturing milk shippers is by "farm location in relation to urban centres". Production of dairy products in terms of end-use is significantly affected by distance from consumer market. Such factors as perishability, transportation costs, and bulkiness of product determine that, for the most part, milk for fluid consumption is produced adjacent to urban centres while milk for manufacturing is produced in the more outlying regions. These two criteria, value of sales per cow and farm (township) location with respect to urban centres, formed the basis for identifying four townships within a selected county in each production region into these townships likely to be predominantly fluid milk production areas and those likely to be predominantly manufacturing milk production areas.

The selection of a county in each production region was, in part, a matter of judgment. However, one criterion was used to help in the selection. This was that the county selected should be one in which the product-typed census-farms were predominantly of dairy-type, that is, 50 percent or more of all the census product-typed farms. In Ontario, there were two regions where this criterion could not be met: Southern and Western Ontario (for Southern Ontario, the difference was very minor: 48 percent compared with the required 50 percent). This selection criterion drew into the purposive sample a group of counties for each province having at least as many dairy farms proportionately as did the province as a whole. In Ontario, census dairy farms represented 30 percent of all product-typed census-farms while the selected counties contained 46 per-





cent dairy farms. In Quebec, the proportion of dairy farms for the province was 63 percent and the selected counties contained 70 percent dairy farms. The number of dairy farms in the selected townships (in the selected counties) represented a purposive sample of six percent for Ontario dairy farms and four percent for Quebec dairy farms.

The Northern Ontario Region presented a special problem for the selection of a "representative" county because of the widely varying agricultural production conditions and market opportunities. Therefore, two counties were selected. One of these, Timiskaming, was on the eastern border of the region and contained no "large" urban center⁶. Although it might be expected that the majority of milk producers in this district would be manufacturing milk shippers, the Ontario Milk Marketing Board Group II (industrial) pool for 1970 showed 53 shippers compared with 105 Group I (fluid) pool shippers. The other district (county) selected was Thunder Bay from the western part of the region. The majority of milk producers in this district would

be fluid milk shippers supplying the market of Thunder Bay (Fort William-Port Arthur).

⁶The main urban center(s) for each of the selected counties and their 1966 population counts were:

Province, Region and County	Name of Urban Center(s)	Population (1966)
Ontario		
1-34	Woodstock	24,000
2-37	Stratford	23,100
3-18	Belleville-Trenton	46,500
4-11	Kingston M.A.	71,500
5-48	Haileybury-New Liskeard-Cobalt	10,600
5-47	Thunder Bay M.A.	97,800
Quebec		
1-58	Rivière du Loup	11,600
2-16	Chicoutimi-Jonquière M.A.	109,100
3-39	Lévis, M.A.	45,200
4-50	Trois-Rivières M.A.	94,500
5-64	Granby-Farnham	41,100
6-61	St-Hyacinthe	23,800
7-51	Buckingham	7,200
8-68	Ville-Marie	2,000

(The abbreviation M.A. = Metropolitan Area)

Source: 1966 *Census of Canada: Population*, Cat. No. 92-607, Tables 10 and 11, Dominion Bureau of Statistics.

TABLE 1—COUNTIES AND TOWNSHIPS SELECTED FOR STUDY OF CENSUS DAIRY FARMS BY MARKET OUTLET, ONTARIO AND QUEBEC, 1966

Province, Region Number and Name	Selected Counties	Selected Townships ^a			
		A	B	C	D
	census number and name	census number			
Ontario					
1. Southern.....	34. Oxford.....	8	6 ^b	5	7
2. Western.....	37. Perth.....	7	11	2	3
3. Central.....	18. Hastings.....	11	10	3	15
4. Eastern.....	11. Frontenac.....	4	2	13	7
5a. Northern.....	48. Timiskaming.....	2	4	7	8
5b. Northern.....	47. Thunder Bay.....	11	2	9	12
Quebec					
1. Gaspésie-Lower St. Lawrence....	58. Rivière du loup.....	18	7	17	12
2. Saguenay-Lake St-Jean.....	16. Chicoutimi.....	3	12	14	4
3. Québec.....	39. Lotbinière.....	19	3	12	4
4. Trois-Rivières.....	50. Nicolet.....	7	9	3	8
5. Eastern Townships.....	64. Shefford.....	5	14	3	7
6. Montréal.....	61. St-Hyacinthe.....	5	10	1	7
7. Outaouais.....	51. Papineau.....	29	24	18	10
8. Abitibi-Témiscamingue.....	68. Témiscamingue.....	12	3	2	1

^a Township numbers (also county numbers) correspond to the designations for the 1966 *Census of Agriculture*, Dominion Bureau of Statistics, Cat. Nos. 96-607 (Ontario report) and 96-606 (Quebec report).

^b In Oxford county, although township No. 6 (Norwich S.) was the most distant from the urban center (Woodstock), no township was strictly "outlying" in the economic sense. For example, Tillsonburg, population 6,500, adjoins the township of Norwich South.

A = Lowest sales per cow township.

B = Outlying township.

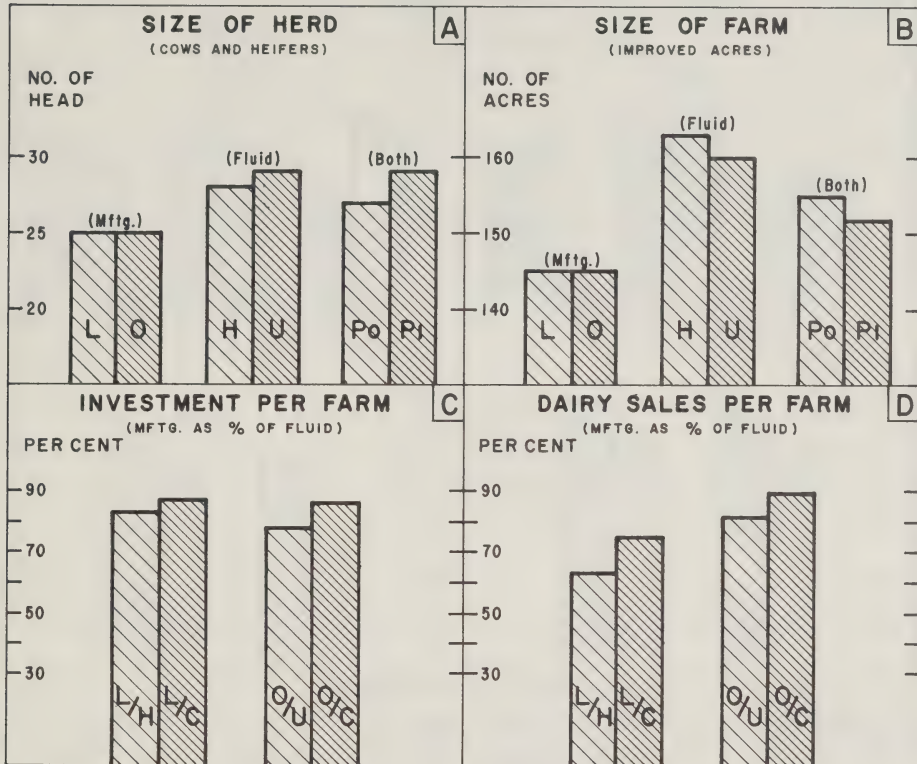
C = Highest sales per cow township.

D = Urban fringe township.

The study regions specified for this analysis were the same as used in the previous article¹. To briefly recap, Ontario was divided into five economic regions. For statistical purposes, the boundaries corresponded to the designated "agricultural districts". Generally, the boundaries of these regions agreed with the boundaries of the Ontario milk distribution areas as specified by the Ontario Milk Marketing Board. In Quebec, the economic regions chosen corresponded generally to the "agricultural regions" described by the Quebec Department of Industry and Commerce. Table 1 lists each region and county as specified for this study by chosen name and identifying numbers. This table also lists, by census code number, the townships selected according to the specified criteria in each selected county of each economic region.

In order to test the representativeness for the primary dairy industry of the counties selected for study, group averages were calculated and compared with the weighted provincial means. (Since the sample was a purposive one, the usual statistical tests for representativeness could not be applied.) Generally, the comparisons indicated that the counties selected provided unweighted provincial means which were close to the weighted provincial means. Two of these comparisons are shown in panels A and B of Figures 1 and 2 (identified with the letter P). In Quebec, the selected-county unweighted means for the province were somewhat closer to the weighted provincial means than were the means for Ontario. Variations among regions within a province were measured by calculating standard errors of the unweighted means.

SELECTED PARAMETERS OF ONTARIO DAIRY FARMS (ALL REGIONS)



KEY TO SYMBOLS

L = LOWEST SALES PER COW TOWNSHIP	L/H = LOWEST SALES PER COW TWP. AS % OF HIGHEST
O = OUTLYING TOWNSHIP	L/C = LOWEST SALES PER COW TWP. AS % OF COUNTY AVERAGE
H = HIGHEST SALES PER COW TOWNSHIP	O/U = OUTLYING TWP. AS % OF URBAN FRINGE
U = URBAN FRINGE TOWNSHIP	O/C = OUTLYING TWP. AS % OF COUNTY AVERAGE
Po = AVERAGE OF SELECTED COUNTIES	Mftg. = MANUFACTURING MILK, TWP. = TOWNSHIP
Pi = WEIGHTED PROVINCIAL AVERAGE	

FIGURE 1

The township comparisons presented in Figures 1 and 2 generally were consistent also for the selected parameters between provinces. There the reader can verify that size of herd tended to be smaller for townships having the lowest value of sales per cow and/or were outlying townships than for the townships with the highest value of sales per cow and/or were urban townships (panels A). Similarly, with size of farm in

improved acres (panels B), investment per farm (panels C) and value of sales of dairy products per farm (panels D). Therefore, within the limitations of the data employed, the conclusion had to be that the selected counties and townships generally provided parameter estimates representative of the two classes of milk shippers for each region and each province.

SELECTED PARAMETERS OF QUEBEC DAIRY FARMS (ALL REGIONS)

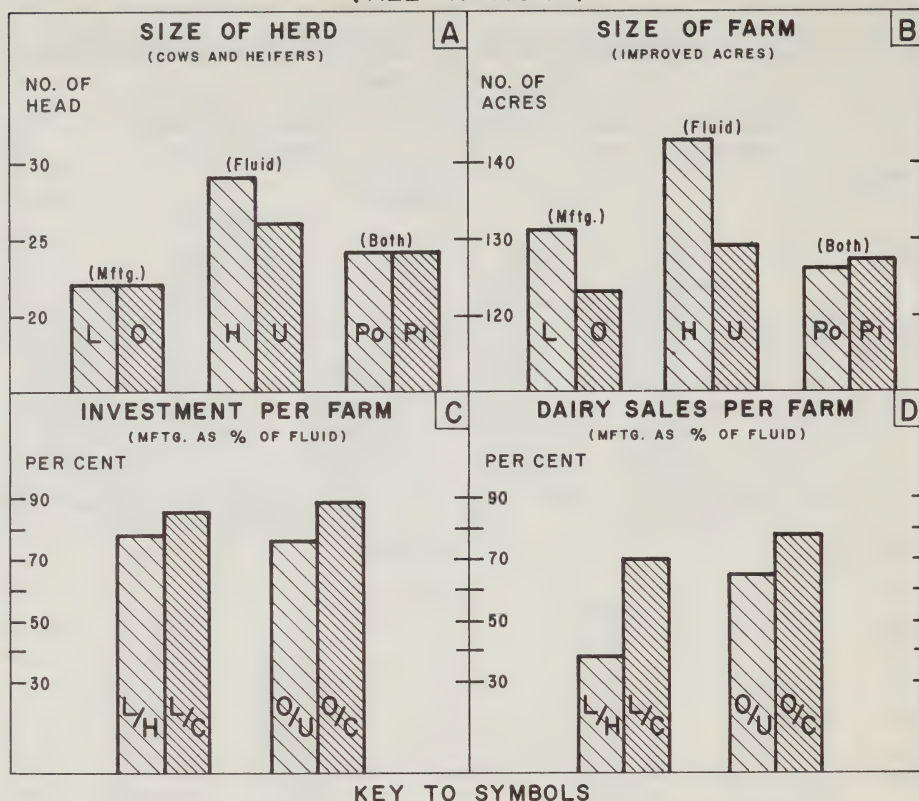


FIGURE 2

— SEE FIGURE 1 —

RESULTS AND DISCUSSION

In this section, the results of the analysis will be presented and discussed under eight subheadings. As indicated at the beginning of the paper, the primary object of the analysis will be to characterize selected parameters of fluid milk producing farms compared with non-fluid milk producing farms and to explain some of the underlying factors for any differences shown to exist⁷.

⁷In the discussion which follows, the premise will be adopted that the methods chosen to characterize fluid milk production areas from manufacturing milk areas were generally successful. This will permit some simplification of the presentation. Therefore, unless otherwise specified it is to be understood that whenever the term "fluid milk" farms (or equivalent) is used this refers to those areas identified as being fluid milk production areas according to the specified characteristics. Likewise for "manufacturing milk" farms (or equivalent).

Size of Herd

Manufacturing milk herds tended to be smaller in terms of cow numbers in both Ontario and Quebec (Table 2). In Ontario, the manufacturing milk herds were about 15 percent smaller than the fluid milk herds. In Quebec, manufacturing milk herds were about 20 percent smaller. In terms of total cattle numbers, the differences were less significant. In Ontario, the manufacturing milk farms were about five percent smaller than the fluid milk herds while, in Quebec, the manufacturing milk farms were about 10 percent smaller.

The largest herd-size manufacturing milk farms in Ontario were located in the Southern Region where the manufacturing milk farms appeared to be larger in average herd size than the fluid milk farms. While

TABLE 2—AVERAGE SIZE OF HERD, CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township		Outlying Township		Highest Sales per Cow Township		Urban Fringe Township	
	All Cattle	Cows and Heifers	All Cattle	Cows and Heifers	All Cattle	Cows and Heifers	All Cattle	Cows and Heifers
number of head per farm								
Ontario								
1-34.....	53	32	52	29	48	26	58	33
2-37.....	56	29	52	26	57	29	57	31
3-18.....	34	19	47	26	49	33	42	26
4-11.....	47	25	46	24	46	26	50	30
5-48.....	50	22	50	22	44	27	64	28
5-47.....	39	23	39	24	43	24	40	24
Average.....	46	25	48	25	48	28	52	29
Quebec								
1-58.....	29	18	31	19	34	22	34	22
2-16.....	49	24	38	23	38	26	39	25
3-39.....	36	19	45	24	32	21	35	21
4-50.....	31	21	30	20	49	34	44	31
5-64.....	38	27	37	27	45	34	45	34
6-61.....	30	22	30	21	58	42	32	24
7-51.....	35	22	30	19	49	33	41	26
8-68.....	45	24	43	22	40	23	40	23
Average.....	37	22	36	22	43	29	39	26

this actually may have been the case, it was not supported by the data for the Ontario Dairy Herd Improvement Associations (see Table 12). Therefore, the possibility exists that the identification criteria were not sufficiently precise enough to distinguish the manufacturing milk herds from the fluid milk herds in this region. The smallest manufacturing milk herds were found either in the Central Ontario Region or the Timiskaming district of Northern Ontario. The Ontario fluid milk herds, for the greater part, did not differ significantly in average size between regions. Although the smallest fluid milk herds appeared to be in the Thunder Bay district of Northern Ontario (24 cows), all other regions had about the same average sizes of herds. The Central Ontario Region had the greatest relative difference in herd size for any region between the two types of milk producers. Here, the manufacturing milk herds were almost 25 percent smaller than the fluid milk herds.

In Quebec, the smallest manufacturing milk herds were in the Gaspésie-Lower St. Lawrence Region

while the largest herds were in the Eastern Townships Region. The smallest fluid milk herds were in the Gaspésie-Lower St. Lawrence and the Québec City Regions while the largest herds were in the Eastern Townships and Montréal Regions. In the Québec City and Témiscamingue Regions, fluid milk herds and manufacturing milk herds were about the same average sizes. However, the Trois-Rivières and Montréal Regions had the greatest relative differences in herd size between the two types of shippers with the manufacturing milk herds being about 35 percent smaller than fluid milk herds.

The main conclusion is that almost all manufacturing milk herds have the potential herd sizes to become fluid milk shippers. This conclusion appears generally valid for all regions in both provinces. Since the difference amounts to 15 to 20 percent in average herd size, a gap such as this could be closed in a relatively short period of time, probably less than five years, if the fluid milk market were available to present manufacturing milk shippers.

TABLE 3—ACREAGE PER FARM OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township		Outlying Township		Highest Sales per Cow Township		Urban Fringe Township	
	Total Area	Improved Area	Total Area	Improved Area	Total Area	Improved Area	Total Area	Improved Area
acres per farm								
Ontario								
1-34.....	171	147	149	130	128	114	154	140
2-37.....	140	125	146	128	155	140	157	137
3-18.....	352	120	309	116	640	188	228	145
4-11.....	478	168	374	188	294	146	292	158
5-48.....	263	165	239	176	397	223	324	220
5-47.....	398	143	267	134	281	166	362	162
Average.....	300	145	247	145	316	163	253	160
Quebec								
1-58.....	260	133	254	125	200	138	164	122
2-16.....	213	161	287	135	219	139	177	145
3-39.....	167	103	217	125	131	94	131	94
4-50.....	198	122	238	102	198	158	168	137
5-64.....	178	101	370	96	198	125	204	146
6-61.....	169	129	134	101	136	134	107	103
7-51.....	231	145	246	153	181	149	212	163
8-68.....	255	151	277	145	298	204	275	121
Average.....	209	131	253	123	195	143	180	129

Size of Farm and Land Use

In Ontario, the acreage of improved land of manufacturing milk farms averaged about 10 percent less than the improved land area of the fluid milk farms (Table 3). The difference was less marked in Quebec, but still significant. Regionally, in Ontario, the difference between the two market types was most marked in Central Ontario where manufacturing milk farms were almost 30 percent smaller in improved land area than were the fluid milk farms. However, in Eastern Ontario, the opposite situation prevailed and the manufacturing milk farms had about 15 percent more land. In Quebec, the greatest relative difference in improved land area per farm was in the Eastern Townships where the manufacturing milk farms were almost 30 percent smaller than the fluid milk farms. However, manufacturing milk farms in the Quebec City Region had 20 percent more improved land than did the fluid milk farms. Generally, as average farm size (in improved acres) increased by region, acres per cow declined for both types of dairy farms in both provinces.

The relationships for total acreage in farms between the two classes of milk shippers were less clear-cut than on the improved acreage basis. In Ontario, the

total acreage in manufacturing milk farms averaged about five percent less per farm than the total acreage of fluid milk farms. However, there was considerable variation between regions (and likely also between farms within a region). For example, in the Temiskaming district of Northern Ontario, manufacturing milk farms were 30 percent smaller in area than the fluid milk farms, but in the Eastern Ontario Region, the manufacturing milk farms were 45 percent larger.

In Quebec, total area per farm varied less among regions than for Ontario. However, manufacturing milk farms in Quebec averaged almost 25 percent larger in total area than did fluid milk farms. Furthermore, they were larger, on average, than the fluid milk farms in most regions. One exception was the Abitibi-Témiscamingue Region where manufacturing milk farms tended to be smaller in total area than fluid milk farms. This latter relationship was consistent with that shown for the Temiskaming district of Ontario although the differential was much less.

Differences in land use for grain, forage and improved pasture between the two types of milk shippers (Table 4) tended to follow the same patterns

TABLE 4—LAND USE PER FARM OF CENSUS DAIRY FARMS BY MAJOR CATEGORIES, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township			Outlying Township			Highest Sales per Cow Township			Urban Fringe Township		
	Grain	Hay and Forage	Im- proved Pasture	Grain	Hay and Forage	Im- proved Pasture	Grain	Hay and Forage	Im- proved Pasture	Grain	Hay and Forage	Im- proved Pasture
acres per farm												
Ontario												
1-34.....	51	27	34	47	23	24	41	17	22	46	26	26
2-37.....	41	20	31	43	22	37	47	27	33	52	30	27
3-18.....	30	37	22	23	25	24	29	78	52	42	23	28
4-11.....	14	53	58	11	55	106	26	25	36	30	39	40
5-48.....	34	82	46	66	64	42	53	118	46	46	95	61
5-47.....	11	120	2	24	76	32	26	74	40	22	91	32
Average..	30	56	32	36	44	44	37	56	38	40	51	36
Quebec												
1-58.....	30	32	32	32	58	30	31	72	30	29	49	32
2-16.....	12	81	65	14	75	41	10	87	38	15	72	43
3-39.....	6	63	30	18	72	33	13	52	25	12	47	30
4-50.....	28	56	34	9	47	38	20	66	46	23	63	48
5-64.....	14	42	39	7	67	12	13	65	39	21	82	40
6-61.....	34	43	32	21	43	31	25	57	36	22	10	28
7-51.....	32	59	49	30	67	44	32	48	40	36	81	45
8-68.....	24	79	39	26	72	43	18	112	61	22	49	29
Average..	22	57	40	20	63	34	20	70	39	22	57	37

as improved land. For the Ontario manufacturing milk farms, the acreage in grain was about 15 percent less than for the fluid milk farms. In Quebec, there was no overall significant difference in grain acreage per farm between the two types of dairy farms for the province as a whole but there were marked regional differences, as there were in Ontario. The total area in grain per farm on Ontario dairy farms of either class of shipper was greater than the grain area per farm in the Quebec dairy farms by more than 50 percent. In both Ontario and Quebec, the acreage in forage crops and improved pasture on the manufacturing milk farms was about five percent less than for the fluid milk farms. However, in contrast to the grain area per farm, the total acreage of forage and pasture was somewhat more per farm for the Quebec dairy farms than for the Ontario dairy farms of either type of shipper. Overall, the differences in land use, at least at the level analyzed, between manufacturing milk farms and fluid milk farms, are of a relatively (or absolutely) limited nature in either Ontario or Quebec within a given region.

Capital Investment

The measurement of some parameters of the primary dairy industry, or of any other industry for that

matter, is possible only in monetary values. Such measures, at least in absolute terms, can become outdated in relatively short time-periods and particularly in periods of rapidly changing prices. Although the absolute levels of these parameters may change significantly, the relationships between them for one sector and another are usually more stable. This is so if they are subjected to the same exogenous economic forces to the same degree. Since the concern in this paper is largely with the relationships of the basic parameters of the fluid milk dairy farms to the manufacturing milk dairy farms, any parameters measured in monetary values will be compared in relative terms rather than in absolute values in order to avoid some of the problems inherent in changing price levels.

In Ontario, total investment per farm in the manufacturing milk subsector was about 20 percent less than in the fluid milk subsector in 1966 (Table 5). This differential reflected smaller average investment in all three major investment categories, but principally smaller real estate investment. For the province as a whole, the investment in real estate of the manufacturing milk farms was about 25 percent less than for the fluid milk farms. However, the livestock investment per farm was only about five percent less, due to somewhat smaller herds and also likely to lower values per head for livestock.

TABLE 5—RELATIVE CAPITAL INVESTMENT PER FARM OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township as Percentage of Highest Sales per Cow Township				Outlying Township as Percentage of Urban Fringe Township			
	Real Estate	Machinery and Equipment	Livestock and Poultry	Total Investment	Real Estate	Machinery and Equipment	Livestock and Poultry	Total Investment
percentage								
Ontario								
1-34.....	122	106	118	119	113	99	88	106
2-37.....	78	80	101	83	84	76	91	84
3-18.....	83	70	70	77	64	86	109	77
4-11.....	58	69	100	69	32	73	86	46
5-48.....	63	67	95	71	70	70	77	72
5-47.....	58	85	96	67	62	107	104	79
Average.....	78	80	97	82	72	86	91	78
Quebec								
1-58.....	37	56	87	48	80	105	118	92
2-16.....	98	66	114	95	62	102	94	73
3-39.....	73	60	59	66	91	102	127	102
4-50.....	47	57	66	53	56	53	69	58
5-64.....	67	78	76	71	84	81	80	83
6-61.....	66	56	63	63	63	64	53	62
7-51.....	79	58	76	74	51	70	76	59
8-68.....	78	67	110	81	102	115	104	106
Average.....	68	62	77	68	70	84	88	76

In Quebec, the investment per farm of the manufacturing milk producers was also less for each of the three major components of farm capital (Table 5). The total capital investment of the manufacturing milk shippers was almost 30 percent less than for the fluid milk farms with real estate being the lowest. The least difference, as in Ontario, was for the livestock investment but even this was about 20 percent less on the manufacturing milk farms than on the fluid milk farms.

Again, there were marked regional differences in the investment relationships of milk shippers in both provinces. In Eastern Ontario, total capital investment per manufacturing milk farm was over 40 percent less than on the fluid milk farms in the same region. In Quebec, the Trois-Rivières Region showed the greatest disparity in total investment per farm between the two groups of milk shippers with the manufacturing milk farms being almost 45 percent smaller in total investment.

Evidently, manufacturing milk farms differ in their capital investment from fluid milk farms largely in the real estate category. This suggests, therefore, that if present manufacturing milk shippers are to become fluid milk shippers, the greatest change in their investments will be in the real estate category. While part of the difference in investment in real

estate between the two classes of milk shippers is due to the smaller average farm size of the manufacturing milk farms, part of it is due also to differences in land values reflecting type of market served. In other words, so long as fluid milk quotas mean a higher product price and so long as these quotas are allocated to specific farm units, then the value of the real estate in fluid-milk-producing farms will reflect the value of these quotas in income-earning potential. Hence, quotas tend to become capitalized into land values.

Sales of Farm Products

Sales per farm of all products, and of dairy products only, were less on manufacturing milk farms than on fluid milk farms, in both Ontario and Quebec, in 1966 (Table 6). However, the differential was somewhat greater for the value of dairy products sold than it was for sales of all farm products. In Ontario, the value of dairy products sold per farm on manufacturing milk farms was about 30 percent less than sales from the fluid milk farms, while sales of all farm products were about 25 percent less. In Quebec, the differential between the two types of dairy farms was much greater. Dairy product sales by manufacturing milk farms were about 50 percent less per farm than for Quebec fluid milk farms, while sales of all farm products were about 40 percent less.

TABLE 6—RELATIVE VALUE OF SALES PER FARM OF ALL FARM PRODUCTS AND OF DAIRY PRODUCTS OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township as Percentage of Highest Sales per Cow Township		Outlying Township as Percentage of Urban Fringe Township	
	All Products	Dairy Products	All Products	Dairy Products
percentage				
Ontario				
1-34.....	94	99	92	88
2-37.....	90	83	84	82
3-18.....	44	34	82	72
4-11.....	56	52	84	84
5-48.....	44	37	83	64
5-47.....	66	70	97	95
Average.....	67	63	87	82
Quebec				
1-58.....	67	47	92	84
2-16.....	39	34	75	74
3-39.....	52	38	67	58
4-50.....	50	43	62	52
5-64.....	49	50	60	62
6-61.....	44	30	56	76
7-51.....	35	26	60	47
8-68.....	71	52	95	79
Average.....	49	38	69	64

The regional differences suggest that where alternatives exist to dairying, incomes of manufacturing milk producers tend to be closer to those of fluid milk shippers than otherwise. In Ontario, the Southern and Western Regions and the Thunder Bay district of the Northern Ontario Region had total average farm incomes from all products in the manufacturing milk subsector of 10 to 20 percent less than for the fluid milk farms. However, in the Central

Ontario Region and the Timiskaming district of Northern Ontario, the manufacturing milk farms had incomes averaging around 35 percent less than the incomes of fluid milk farms. In Quebec, total average incomes from sales of all farm products for the manufacturing milk farms in the Gaspésie-Lower St. Lawrence and Abitibi-Témiscamingue Regions were 15 to 20 percent less than the total incomes of fluid milk farms. In all other regions,

TABLE 7—SELECTED EXPENSES PER FARM OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township as Percentage of Highest Sales per Cow Township		Outlying Township as Percentage of Urban Fringe Township	
	Taxes and Rents	Hired Labor	Taxes and Rents	Hired Labor
percentage				
Ontario				
1-34.....	124	113	69	107
2-37.....	98	41	98	72
3-18.....	62	38	93	55
4-11.....	62	31	67	47
5-48.....	82	0	68	10
5-47.....	97	0	81	143
Average.....	88	37	79	68
Quebec				
1-58.....	83	14	120	54
2-16.....	137	...	100	61
3-39.....	66	28	102	24
4-50.....	61	36	65	42
5-64.....	97	28	177	122
6-61.....	34	21	68	346
7-51.....	39	...	76	74
8-68.....	77	0	125	20
Average.....	67	25	100	86

... = not available (less than three farms reported item).

however, total average incomes from sales of farm products were 40 to 50 percent less than the average sales of fluid milk farms.

Farm Expenses

The data on farm expenses from the 1966 Census of Agriculture were limited to the items shown in Table 7. These data provide, however, measures of certain "fixed" expenses (property taxes and rents), and "variable" expenses (hired labor). However, even hired labor costs are a fixed cost in the short run and especially if hired by the year.

Property taxes and/or land rents were about 15 percent less per farm in Ontario for the manufacturing milk farms compared with the fluid milk farms. These expenditures were less, relatively, for the manufacturing milk farms in all regions. This largely reflects the smaller farm area of the manufacturing milk farms in both improved and total area. Hired labor costs on Ontario manufacturing milk farms were more than 45 percent less per farm than for the fluid milk producers, but there was considerable variation among regions. In Northern Ontario, for example, no hired labor costs were reported for most of the manufacturing milk farms so that the overall average costs per farm were close to zero.

In Quebec, the relationships of the particular expenditures for the two classes of milk shippers were generally the same as in Ontario: property taxes and/or rents per farm were 15 percent less and hired labor costs per farm were about 45 percent less also.

However, in four of the eight Quebec regions, property taxes and/or rents per manufacturing milk farm equalled or exceeded these expenses for the fluid milk farms in the same regions. Hired labor costs per farm were less, however, than for the fluid milk farms except in the Montréal Region. As in Ontario, hired labor costs in the Northern Quebec district of Abitibi-Témiscamingue were almost zero since very few farms hired any labor.

There is much less difference, on average, in fixed expenses, such as property taxes and rents, between fluid milk farms and manufacturing milk farms on a per farm basis than there is in the value of sales of farm products of these farms. However, there is a considerable difference between the two types of shippers in variable expenses such as hired labor. These relationships suggest that fixed expenses form a larger proportion of the total cost structure on manufacturing milk farms than on fluid milk farms and that fixed costs per unit of output are greater. The implication is, therefore, that manufacturing milk producers are either overcapitalized in relation to their current levels of output or that they operate on the assumption that they will be able to increase sales in the future.

Off-farm and Part-time Work by Operators

Income from off-farm work can be a means of equalizing labor earnings of farm operators with differing resource bases. Manufacturing milk farm operators in Ontario worked 40 percent more days off the farm than fluid milk shippers. In Quebec, they

TABLE 8—OFF-FARM WORK OF FARM OPERATORS OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township	Outlying Township	Highest Sales per Cow Township	Urban Fringe Township
days per farm				
Ontario				
1-34.....	14	15	19	12
2-37.....	27	25	19	18
3-18.....	53	20	0	29
4-11.....	43	49	55	25
5-48.....	25	29	6	13
5-47.....	30	37	59	13
Average.....	32	29	26	18
Quebec				
1-58.....	34	44	27	50
2-16.....	85	50	22	20
3-39.....	9	13	54	39
4-50.....	29	46	24	21
5-64.....	93	12	13	9
6-61.....	29	28	0	17
7-51.....	34	32	29	0
8-68.....	75	79	69	60
Average.....	48	38	30	27

TABLE 9—RELATIVE IMPORTANCE OF NUMBERS OF PART-TIME FARM OPERATORS OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, County and Region	Lowest Sales per Cow Township	Outlying Township	Highest Sales per Cow Township	Urban Fringe Township
part-time operators as percentage of all operators				
Ontario				
1-34.....	15	11	14	11
2-37.....	17	15	11	10
3-18.....	23	20	0	18
4-11.....	17	31	37	16
5-48.....	19	27	0	15
5-47.....	22	33	37	6
Average.....	19	23	17	13
Quebec				
1-58.....	14	14	13	32
2-16.....	80	33	15	16
3-39.....	9	10	16	21
4-50.....	15	27	22	10
5-64.....	52	8	10	6
6-61.....	20	32	0	14
7-51.....	25	21	11	0
8-68.....	58	65	25	30
Average.....	34	26	14	16

worked 50 percent more days off the farm than fluid milk shippers (Table 8). There were, however, considerable differences among regions. In the Central Ontario Region and the Timiskaming district of Northern Ontario, days of off-farm work by manufacturing milk producers were more than two and a half times the days of off-farm work by fluid milk shippers in the same regions. Conversely, the amount of off-farm work by manufacturing milk shippers in Southern Ontario and in the Thunder Bay district was about five percent less than the off-farm work by fluid milk shippers.

In Quebec, the amount of off-farm work by manufacturing milk shippers was, on average, much greater than that by the fluid milk shippers in most regions. In four regions, they worked over twice as much off the farm. In one region, the Eastern Townships, the amount of off-farm work by manufacturing milk shippers was almost five times that of fluid milk producers.

Part-time farming, as specified for census purposes⁸, was more important as a way of business for manufacturing milk producers than fluid milk shippers in

⁸A part-time farm operator was defined by the Dominion Bureau of Statistics for 1966 agricultural census purposes as one who:

- earned \$750 or more from non-agricultural and agricultural work off his farm holding during the 12-month period prior to June 1, or
- worked 75 or more days off his farm holding regardless of amount earned as in (a).

Source: 1966 *Census of Canada: Agriculture-Canada*, Cat. No. 96-601, p. ix.

both Ontario and Quebec. This was especially so in Quebec. In Ontario, around 20 percent of all manufacturing milk producers could be classified as part-time in 1966 compared with approximately 15 percent of the fluid milk producers (Table 9). The greatest proportion of Ontario part-time fluid milk farms were located in Eastern Ontario. In Quebec, about a third of all manufacturing milk farms were part-time operations, while about 15 percent of the fluid milk farms could be classified as part-time. The Abitibi-Témiscamingue Region showed a very high proportion of part-time manufacturing milk farms, over 60 percent, while more than a quarter of the fluid milk farms could be classified as part-time also.

The foregoing suggests that off-farm work is a means of equalizing earnings of farm operators among different sizes and types of dairy farms in different regions. At the same time, however, it is evident that farmers in some regions have greater opportunities for off-farm earnings than do farmers in other regions. Since a greater proportion of the Quebec dairy farmers were part-time operators, total family earnings for milk producers in Quebec would be more comparable with the earnings of Ontario milk producers, at least in 1966, than would be indicated by comparisons of herd size, farm size or sales volume.

Tenure of Operators

Dairy census-farms in Ontario and Quebec were predominantly operator-owned in 1966, but there were

TABLE 10—RELATIVE IMPORTANCE OF FARM OWNERSHIP, TENURE OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, Region and County	Lowest Sales per Cow Township	Outlying Township	Highest Sales per Cow Township	Urban Fringe Township
percentage of all farms entirely owned ^a				
Ontario				
1-34	63	70	76	72
2-37	88	80	78	76
3-18	69	75	71	72
4-11	42	73	74	67
5-48	94	100	50	70
5-47	78	83	53	69
Average	72	80	67	71
Quebec				
1-58	86	83	81	92
2-16	100	83	81	82
3-39	91	86	87	88
4-50	93	85	80	94
5-64	96	71	92	97
6-61	87	92	90	100
7-51	75	68	33	67
8-68	96	96	62	95
Average	91	83	76	89

^a Refers to census-farms owned entirely by the operator as contrasted with census-farms partly owned-partly rented, rented entirely or managed.

significant differences both between the two provinces and among the various regions. There were important differences too, in tenure patterns between manufacturing and fluid milk shippers (Table 10). In Ontario, about three-quarters of all manufacturing milk farms were operator-owned compared with about 70 percent for fluid milk farms. For the manufacturing milk farms, the highest proportion of operator ownership was in the Timiskaming district of Northern Ontario, almost 100 percent, while the lowest ratio was in Eastern Ontario, about 60 percent.

In Quebec, operator-ownership was generally higher than in Ontario and manufacturing milk farms were more highly operator-owned than were the fluid milk farms. More than 85 percent of all Quebec manufacturing milk farms were entirely operator-owned while about 80 percent of all fluid milk farms were. The lowest ratio of operator-ownership, for both manufacturing and fluid milk farms, was in the Outaouais Region—less than three-quarters of all manufacturing milk farms and about 50 percent for fluid milk farms. The highest ratio of operator-ownership for manufacturing milk farms was in the Abitibi-Témiscamingue Region, over 95 percent, while the highest ratios for fluid milk farms were in the Eastern Townships and Montréal Regions, around 95 percent also.

The evidence supports the conclusion that fluid milk producers appear to be able to expand their land resource base by renting additional land. An exception to this generalization appears to be for fluid milk farms in those regions where there is non-farm competition for land, that is, those regions containing large urban centers.

Age of Operators

The age distribution of the manufacturing milk producers in Ontario, compared with the fluid milk shippers, was generally the same, with roughly 15 percent less than 35 years old, 60 percent 35 to 54 years old, and 25 percent 55 years and older (Table 11). In Quebec, however, manufacturing milk shippers tended to be younger than fluid milk producers—about 80 percent of manufacturing milk shippers were less than 55 years old compared with 75 percent of the fluid milk shippers. Roughly 25 percent were less than 35 years of age compared with 20 percent for fluid milk producers.

There were marked regional differences for operator age distributions in both provinces. Southern Ontario had a higher proportion of older farmers among both fluid and manufacturing milk shippers than any other region of the province, with over 40 percent 55 years and over. In Eastern Ontario, also, a significant proportion, over one-third, of the fluid milk

TABLE 11—RELATIVE IMPORTANCE OF AGE GROUPINGS OF FARM OPERATORS OF CENSUS DAIRY FARMS, SELECTED COUNTIES AND TOWNSHIPS, ONTARIO AND QUEBEC, 1966

Province, County and Region	Lowest Sales per Cow Township			Outlying Township			Highest Sales per Cow Township			Urban Fringe Township		
	Under 35 years	35 to 54 years	55 years and over	Under 35 years	35 to 54 years	55 years and over	Under 35 years	35 to 54 years	55 years and over	Under 35 years	35 to 54 years	55 years and over
percentage of all operators												
Ontario												
1-34.....	11	58	31	7	41	52	9	50	41	12	60	28
2-37.....	12	60	28	18	57	25	15	55	30	20	68	12
3-18.....	15	62	23	5	54	41	0	71	29	8	61	31
4-11.....	8	75	17	11	62	27	7	54	39	7	53	40
5-48.....	25	44	31	14	66	20	30	30	40	15	65	20
5-47.....	33	56	11	17	83	0	32	58	10	17	63	20
Average..	17	59	24	12	61	28	16	53	32	13	62	25
Quebec												
1-58.....	9	67	24	21	55	24	10	71	19	5	80	15
2-16.....	40	60	0	0	58	42	20	60	20	10	46	44
3-39.....	23	59	18	33	52	14	16	64	20	7	63	30
4-50.....	20	58	22	23	50	27	15	75	10	14	51	35
5-64.....	24	64	12	12	63	25	18	56	26	19	59	22
6-61.....	20	60	20	22	65	13	0	80	20	28	39	33
7-51.....	50	50	0	21	58	21	22	56	22	17	50	33
8-68.....	29	58	13	13	78	9	50	38	12	27	58	15
Average..	27	60	14	18	60	22	19	62	19	16	56	28

shippers were aged 55 and over. In Quebec, the Gaspésie-Lower St. Lawrence, Saguenay-Lake St-Jean and Trois-Rivières Regions had the highest proportions of the oldest (55 years and over) manufacturing milk producers. The Saguenay-Lake St-Jean, Montréal and Outaouais Regions had the oldest dairy farm operators in the province. It is evident that younger farmers are more likely to be shipping manufacturing milk, at least in Quebec, than they are to be fluid milk shippers. However, as pointed out in a previous section, a greater proportion of manufacturing milk producers, and especially in Quebec, are engaged in off-farm work or part-time farming. It is likely, therefore, that younger farmers have more opportunities for off-farm work, particularly if the alternatives are largely in the lumbering or pulp and paper industries.

CHANGES IN DAIRYING SINCE 1966

In this study the analysis and discussion has been based largely upon data derived from the 1966 Census of Agriculture. However, some attempt will now be made to quantify the changes in leading parameters of dairy farms for the last half of the

1960's. The availability of suitable (comparable) data for such an exercise is limited to a few sources. Much of the data in itself from these sources is of a dynamic nature, reflecting institutional and technological changes which complicate efforts to measure changes in the primary dairy industry as a whole.

Source of Data

There are two major sources of data that have possibilities for evaluating changes since 1966. In Ontario, there are the costs and returns analyses performed by the Farm Economics, Co-operative and Statistics Branch of the Ontario Department of Agriculture and Food for some of the farms (herds) in the Ontario Dairy Herd Improvement Associations (D.H.I.A.). For Quebec, there are the Dairy Herd Analysis Service (D.H.A.S.) analyses conducted by the Department of Animal Science of Macdonald College in co-operation with the Quebec Department of Agriculture and Colonization. Both of these programs provide useful management analyses for the co-operating dairy farmers but the results are limited in their applicability for measuring industry trends.

TABLE 12—SELECTED RELATIVE DATA FOR ONTARIO DAIRY HERD IMPROVEMENT ASSOCIATIONS HERDS ON COST ANALYSIS, 1966 TO 1969

Milk Distribution Areas (Zones) and Year	Herd Size	Manufacturing Milk Herds as Percentage of Fluid Milk Herds		Labor Use per Hundredweight of Milk
		Sales per Cow ^a		
		lbs.	\$	
Southern		percentage		
1966.....	91	100	78	100
1967.....	76	100	84	114
1968.....	85	100	82	100
1969.....	86	95	74	112
Western				
1966.....	97	95	75	100
1967.....	88	97	85	114
1968.....	89	94	80	114
1969.....	89	95	73	114
Central				
1966.....	71	94	67	89
1967.....	71	85	72	112
1968.....	78	90	68	112
1969.....	85	94	68	125
Eastern				
1966.....	76	91	73	112
1967.....	76	96	80	112
1968.....	75	95	76	129
1969.....	79	95	72	112
All areas ^b				
1966.....	88	100	75	100
1967.....	83	97	79	100
1968.....	83	97	76	100
1969.....	84	96	72	112
Changes 1966 to 1969		percent		
Southern.....	- 5.5	-5.0	-5.1	+12.0
Western.....	- 8.2	.0	-2.7	+14.0
Central.....	+19.7	.0	+1.5	+40.4
Eastern.....	+ 3.9	+4.4	-1.4	.0
All areas.....	- 4.6	-4.0	-4.0	+12.0

^a Includes the amount and value of milk used on the farm in 1966 and 1967 but excludes this in 1968 and 1969. The quantity involved would be about one percent (on average) of production.

^b Includes data for fluid milk farms in the northern area which has no manufacturing milk farms.

Source: Donald M. MacKay, Farm Economics, Co-operatives and Statistics Branch, Ontario Department of Agriculture and Food, Toronto.

The data given in Table 13 for the Quebec D.H.A.S. herds provides a useful insight into the difficulties inherent in these kinds of data for evaluating changes in the industry over time. The D.H.A.S. (or D.H.I.A.) farms are a sub-population, rather than a sample of the total dairy farm population. But these sub-populations are changing, so that any means (or variances) obtained reflect not only changes for given farms but also changes in the structure of the sub-population. Some of the differences are shown in Table 13 where comparisons are given by paired means (the same herds in both years) and non-paired means (all herds in the program). On the basis of the paired-herd comparison, the 121 milk producers involved evidently were able to increase their average herd size by two cows and their

production per cow by five percent by employing four percent more labor. No such observation is possible from the unpaired data. These data indicated increases of about two percent in production per cow and one percent in labor used per hundred-weight of milk produced. Thus, in attempting to utilize data from programs such as the D.H.A.S. (or D.H.I.A.) to measure trends, the assumption is being made, that the populations are relatively constant over time in terms of the size distribution of farms and other important parameters.

Changes in Leading Parameters

In Ontario, the D.H.I.A. data indicate that herd size has increased in all regions of the province for

TABLE 13—SELECTED DATA FOR QUEBEC DAIRY HERD ANALYSIS SERVICE HERDS, 1966 TO 1970

	Herds	Cows per Herd	Production per Cow		Labor per Hundredweight of Milk	Sales per Cow
			Milk	Fat		
	number		lbs.	%	hrs.	\$
Herds Registered in						
1966.....	121	35	10,596	3.68	.85	522
1967.....	216	33	10,094	3.57	.81	485
Paired Comparison						
1967.....	121	33	10,085	3.24	.91	493
1968.....	121	35	10,596	3.20	.85	522
All Herds						
Dec. 1968.....	337	34	10,274	3.61	.82	498
Dec. 1969.....	681	34	10,533	3.67	.73	515
Jan. 1970.....	694	33	10,562	3.67	.72	514
Nov. 1970.....	1,046	34	10,492	3.64	.68	501

Source: Professor J. E. Moxley, Department of Animal Science, Macdonald College of McGill University.

both fluid milk and manufacturing milk shippers (not shown in the tables)⁹. Increases in herd size were somewhat greater overall for fluid milk farms than for manufacturing milk farms. Of particular significance, however, was the relatively greater increases in herd size for the fluid milk shippers in the Eastern and Northern Ontario Regions compared with the provincial averages and also for manufacturing milk shippers in the Central and Eastern Ontario Regions. These two regions had the smallest average manufacturing milk herds in 1966. Although milk sales per cow increased in all regions, this was mostly due to higher milk prices rather than to greater milk production per cow in the last half of the 1960's. For the province as a whole, however, the data suggest that the differences between fluid milk herds and manufacturing milk herds have not improved from 1966 to 1969 and may actually have widened (Table 12).

Generally, the relationships evidenced by the Ontario D.H.I.A. data support the findings from census data. The D.H.I.A. manufacturing milk herds in 1969 were about 15 percent smaller in cow numbers than the fluid milk herds, but production (sales) per cow was only about five percent less. However, value of sales per cow was 25 to 30 percent less for the manufacturing milk herds. As was shown by the 1966 census data, the difference between the two classes of shippers for the period 1966 to 1969 was much less in Southern and Western Ontario than in other regions of the province, at least insofar as herd size was concerned.

⁹One of the reasons given for the decrease in numbers of Ontario D.H.I.A. herds on cost analysis, down from 865 herds in 1966 to 424 herds in 1969, is that many have switched to the CANFARM program for tabulation and analysis of their records.

Labor employed to produce a hundredweight of milk on Ontario D.H.I.A. manufacturing milk farms averaged about the same as for the fluid milk herds (Table 12). Labor requirements for milk production in Northern Ontario were higher (on the basis of fluid milk shipper data) than in all other regions of Ontario (not shown in the table). This situation is the result of the longer winter-housing period. No significant change in the labor input per hundredweight of milk during the five years since 1966 was indicated.

In Quebec, data for the farms in the Dairy Herd Analysis Service provide some indications of change since 1966 (Table 13). Generally, the herds in Quebec D.H.A.S. program appear to be similar in many characteristics to the herds in the Ontario D.H.I.A., with the exception of breed distribution. In 1968, Holsteins represented 93 percent of all cows on test in the Ontario D.H.I.A. compared with 87 percent Holsteins in Quebec D.H.A.S. The changes since 1966 appear to have followed much the same trends in both provinces.

The differences between manufacturing milk census farms and fluid milk census farms in Quebec were generally supported by the 1969 D.H.A.S. data (Table 14). These data indicated that manufacturing milk herds were about 20 percent smaller than fluid milk herds and that milk production per cow was about five percent less. The difference in labor inputs between the two types of milk shippers in Quebec was similar to that for the Ontario D.H.I.A. herds. Labor used per hundredweight of milk produced by Quebec D.H.A.S. herds averaged somewhat more for the manufacturing milk herds than the fluid milk herds in 1969.

TABLE 14—SELECTED DATA FOR QUEBEC DAIRY HERD ANALYSIS HERDS CLASSIFIED BY TYPE OF MILK MARKET, 1969

	Fluid Milk Herds	Manufacturing Milk Herds	All Herds	Manufacturing as Percentage of Fluid Milk Herds
				(%)
Number of Herds.....	330	351	681	51.5 ^a
Cows per Herd (no.).....	37.3	29.9	33.5	80.2
Production per cow:				
Milk (lbs.).....	10,928	10,162	10,533	93.0
Fat (%).....	3.68	3.66	3.67	99.4
Labor per Hundredweight of Milk (hrs.).....	.70	.76	.73	108.6
Sales per Cow (\$).....	579	454	515	78.4

Source: Professor J. E. Moxley, *op. cit.*^a Percent of total number of herds.

These data for Quebec are useful also as a means of evaluating some of the changes in dairy farming in the province at the regional level. The greatest increases in average D.H.A.S. herd size since 1966 were in the Québec City and Outaouais Regions—more than 50 percent (Table 15). However, it was not possible from the D.H.A.S. data to determine which regions had shown the largest relative increases in production per cow or to isolate the changes over time for manufacturing milk farms from fluid milk farms at the regional level.

The changes in dairy farming in Ontario and Quebec since the 1966 Census indicate increased herd sizes, increased levels of production per cow and increased value of sales per cow, the latter due in part to greater production per cow but also due to rising prices for milk and butterfat¹⁰. However, no overall change in labor efficiency (manhours used per hun-

¹⁰As was indicated in the earlier article in this series, Table 13, p. 21, manufacturing milk prices rose by eight to 10 percent in Ontario and Quebec and fluid milk prices by 20 to 21 percent from 1966 to 1969.

TABLE 15—SELECTED DATA FOR QUEBEC DAIRY HERD ANALYSIS SERVICE HERDS CLASSIFIED BY REGION^a AND SELECTED COUNTIES, JANUARY 1970 AND NOVEMBER 1970

Region and County	Number of Cows per Herd			Sales per Cow (dollars)		
	Census June '66	D.H.A.S., Jan. '70	D.H.A.S., Nov. '70	Census June '66 ^b	D.H.A.S., Jan. '70	D.H.A.S., Nov. '70
1. Gaspésie—Lower St. Lawrence.....	20.1	27.7	28.8	394	444	427
Rivière du loup.....	20.0	26.5	29.9	340	422	415
2. Saguenay—Lake St-Jean.....	25.3	29.9	37.1	442	498	466
Chicoutimi.....	25.0	29.6	38.1	570	552	542
3. Québec.....	20.2	30.5	30.6	445	501	489
Lotbinière.....	21.0	32.0	30.5	403	494	501
4. Trois-Rivières.....	21.3	31.0	30.5	457	515	518
Nicolet.....	24.0	32.0	34.2	428	488	487
5. Eastern Townships.....	27.4	33.3	33.6	428	482	467
Shefford.....	30.0	37.9	31.4	433	436	415
6. Montréal.....	26.5	35.8	36.8	476	536	527
St-Hyacinthe.....	24.0	34.3	34.5	488	504	521
7. Outaouais.....	23.0	36.0	37.8	472	532	560
Papineau.....	22.0	36.0	36.5	439	532	526
8. Abitibi-Témiscamingue.....	22.2	...	...	395	...	...
Témiscamingue.....	22.0	...	...	403	...	...
All Regions.....	24.3	33.4	34.1	454	511	500

^a As specified for this study. The D.H.A.S. uses a different regional grouping of counties.^b Adjusted for differences in denominator, i.e., the sales shown are in terms of 1966 prices and the D.H.A.S. denominator (cows milking).

... = no D.H.A.S. data available.

Sources: (1) The census data were derived from the tabulations of the 1966 Census of Agriculture data undertaken for this study and adjusted as noted in ^b.(2) Professor J. E. Moxley, *op. cit.*

dredweight of milk produced) was shown in Ontario although there may have been some improvement in Quebec, largely because of greater relative gains in production per cow. Furthermore, manufacturing milk farms in Ontario and Quebec have not narrowed the gaps in average herd size or revenue per cow since 1966. However, on a regional basis, there have been significant changes. In Ontario, the regions with the smallest herd sizes in 1966 have shown the greatest relative increases in herd sizes. This is also the case in Quebec where regions with average herd sizes of 20 cows in 1966 showed increases of more than 50 percent while those areas with the largest average herd sizes in 1966 generally recorded lesser increases, but still about 20 percent. What this all means is that, in 1970 or 1971, regional differences in selected parameters for dairy farms in Ontario and Quebec were less marked at the beginning of the 1970's that they were in the mid-1960's. In other words, the producers in the more disadvantaged regions in both provinces have shown some ability to catch-up with producers in regions which were more favored in 1966 for certain basic parameters.

SUMMARY AND CONCLUSIONS

This article is the second in a two-part series which attempts to specify the basic parameters of the primary dairy industry in Ontario and Quebec. In this second article, the purpose has been to characterize some of the important parameters specific to fluid milk farms and to manufacturing milk farms by economic region. As in the first article, the primary source of data for the analysis was the 1966 Census of Agriculture supplemented with Dominion Bureau of Statistics dairy production and marketing statistics, together with data from provincial dairy production management programs.

It was shown that the manufacturing milk farms were smaller in terms of cow numbers per farm than the fluid milk herds. On the basis of improved area per farm, the manufacturing milk farms also tended to be smaller in size but not to the same degree. However, in terms of total farm area, the relationship was less definitive. In Ontario, the total area per farm of the manufacturing milk farms was smaller than the total area per farm of fluid milk farms, but, in Quebec, manufacturing milk farms were larger in area than fluid milk farms.

The total capital investment per farm of manufacturing milk farms was considerably less than for fluid milk farms. Most of the difference was attribu-

table to the total value of farm real estate being less due to fewer improved acres per farm and to lower land values per acre.

Farm product sales per farm of the manufacturing milk farms were less than for the fluid milk farms and the differences were much greater in Quebec than in Ontario. But the difference between expenditures by both types of producer was similar in both provinces.

A greater proportion of the total income of the manufacturing milk shipper was from off-farm work than for the fluid milk shipper. The difference was proportionately greater for Quebec producers. More manufacturing milk farms than fluid milk farms could be classified as part-time operations, especially in Quebec.

Both types of dairy farms were predominately owner-operated but the manufacturing milk farms were more so. In Quebec, owner-operatorship was higher generally than in Ontario. However, there was evidently an age-tenure interaction since the manufacturing milk shippers in Quebec tended to be younger than the fluid milk shippers. In Ontario, there was not an important difference in the age distributions for the two classes of milk shippers.

Generally, both fluid milk farms and manufacturing milk farms have increased in herd size since 1966 but the increase in average herd size appears to have been somewhat greater for the fluid milk herds than the manufacturing milk herds. However, on a regional basis, the increase in herd size was greatest in the regions which had the smallest herds in 1966. But generally, the manufacturing milk producer has not been able to catch up to the fluid milk shipper.

The main implication from this analysis is that changes in marketing, together with alternative opportunities to manufacturing milk production are needed if the income differentials and returns to resources between the two classes of milk producers are to be narrowed significantly.

ACKNOWLEDGMENTS

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THE CLIMATE FOR AGRICULTURAL TRADE

SHORT AND LONG TERM PROBLEMS

We grow and trade what our weather will allow — other countries do the same.

But national agricultural policy has an effect on trade. As developed countries strive for self-sufficiency, their protected agricultures often produce quantities of products for export. Thus, not only are we kept out of some markets, but we face subsidized competition in third markets.

Advances in technology have led the way for changes in trade. Transportation and storage innovations allow increased trade in traditional, convenience and new foods.

Decision-making, too, has changed. Now traders representing huge corporations, government departments and whole countries make decisions which affect the lives of people the world-over.



*Geoffrey Hiscocks**

For those of us in Eastern Canada who have just "survived" the record winter of 1970-71, with its fantastic volume of snow, the word "climate" is one that has now become an unwelcome subject. The atmospheric climate is one of the most important features of Canadian agriculture. I say agriculture but in fact, of course, we are more concerned with processed products in this discussion and therefore we are not really concerned with agriculture but with food. So perhaps from now on, I should refer to the food climate.

We need to look very carefully at this whole question of the climate as it has at least a two-fold aspect. In the first instance, we must be concerned with our own atmospheric climate and the climate of other countries in terms of temperature and precipitation in their various forms and sequences. In the second instance, we are concerned with the food product trading climate. Is it hot or cold? When and why?

These two aspects of climate are mixed together so closely that one not only impinges on the other but one actually creates the other. I should explain

that I do really mean the atmospheric climate as it affects Canadian agriculture and the climates of our export rivals. I mean the farming weather for growing and harvesting in the United States, in Australia, in Argentina, in the United Kingdom, in the European Economic Community and in the U.S.S.R. For example, these countries have different opportunities for growing and producing wheat.

They produce different types of wheat. They produce it in different volumes in different years, but above all they have the opportunity to produce their own product for their own use very conveniently. In many cases they can produce it and deliver it to their own flour mills at a low cost. This is one of the most important results of the climate for agriculture. Another effect of this weather question is the fact that food importing countries have their own agriculture and take steps to support and maintain it. These countries, too, can produce many food products at a reasonable cost and will give first preference to their own domestic agriculture through various systems and devices.

In spite of these situations in other countries, we have developed in Canada an agricultural production and trading machine which can deliver wheat of very high quality to mills in many countries at a very

*Paper delivered by Dr. G. A. Hiscocks, Director, Economic Policy and Planning Secretariat, Canada Department of Agriculture, Ottawa, on March 11, 1971, at Seminar for Canadian National Millers Association.

reasonable price. Recently, we have taken a very firm look at this production and trading machine. We have made changes in its mechanisms and we have greatly improved many parts of it. There will, no doubt, be further changes to make, both in the short run and the long run. These changes will help to ensure the competitive efficiency of the system in the future. Nevertheless, there will be many problems to face as we trade in world food markets in the future. It is relevant to spend a short time looking in detail at some of the developments, taking place in the world food trading climate. Some of these trends, can be expected to continue and intensify in the future.

Canada's postwar trade in farm products has been characterized by a relatively steady growth of imports, on the one hand, and an erratic, but upward, trend of exports on the other. The erratic shifts in agricultural exports have reflected, in the main, the fluctuating fortunes of wheat. The proportion of wheat and flour to total agricultural exports has ranged from 50 to 66 percent over the past decade.



Our exports of farm products are over twice as great as our imports of products directly competitive with those grown in Canada, since about 60 percent of agricultural imports cannot be grown in the Canadian climate, for example, cotton, tea, citrus fruit, bananas, and rubber.

To look at world agricultural trade today is to look at an area of relative stagnation. There have been no policy breakthroughs and the value of world

agricultural exports has risen very slowly in recent years—compared to the value of other products in world trade.

Agricultural Self-Sufficiency In Developed Countries

Several basic trends are primarily responsible for this disturbing situation in agricultural exports and one of the most obvious is the fact that many developed countries have decided that free trade policy does not apply to agricultural products. Despite frequent and prolonged international negotiation, it is proving very difficult to contain, much less to reverse, the tendency of many developed countries to provide substantial production support and protection to their agricultural industry and thereby increase their self-sufficiency in many basic agricultural products. Greater production is achieved primarily by maintaining high internal prices and by preventing or limiting imports. The protection takes various traditional forms such as high tariffs, import licensing and quotas, but governments are increasingly turning to minimum import pricing and levies. In addition, exporters face a growing number of non-tariff barriers such as the establishment of difficult labelling, additive and residue regulations; complicated phytosanitary documentation; requirements for processing plant inspections (sometimes more demanding than those enforced within the importing country itself) and so on. The adverse impact on Canada's trade is obvious.

Countries with Protected Agricultures and Subsidized Exports

The second trend, closely linked with the previous one of self-sufficiency is the trend toward subsidizing the export of surpluses by countries with highly protected agricultural industries. In practice, countries find it exceedingly difficult to adjust agricultural incentives to produce only the amount of product required to meet domestic demand. Once internal subsidies are in force, it becomes equally difficult, politically and practically, to "turn them off." This accounts for the surplus of butter, wheat and flour which has burdened the European Economic Community (EEC) and which EEC members have pressed on world markets. It has also led the U.K. to become a major barley exporter; and it can be seen in other commodity areas—sugar, apples, skim milk powder, to name a few.

Again, of course, the effects on traditional agricultural exporters such as Canada, are severe. We are not only losing the opportunity to expand trade

into these markets, but we are facing more and heavily subsidized competition in third markets. The deterioration of international prices such as we have seen for wheat and certain dairy products, can be traced in large measure to these policies.

The cost of such programs can be exceedingly heavy and, in the case of the E.E.C., one recent estimate was that the total expense would be some \$14 billion per annum. This estimate counts both the higher indirect cost to consumers, in addition to the direct expenditures for farm price support. This burden may prove to be an effective deterrent to subsidization policy and may complement the pressures by trading nations to reduce internal subsidies in protectionist nations. We have been hoping this rising cost would be reflected in a change in policy for the last four years—but it hasn't.

Developing Countries Continue to Rely on Aid and Concession Sales

Another factor which influences world trade is the trend in developing countries for continued reliance on aid and concessional sales. With one or two notable exceptions, such as China and Brazil, the developing nations of the world still do not account for any significant portion of the commercial demand for temperate-zone agricultural products and no rapid improvement can be anticipated. Efforts have been made to increase their trade earnings and income levels through commodity agreements and improved access to the markets of developed countries. Some improvement has been achieved, but capital goods and industrial raw materials have taken up much of the additional purchasing power generated by exports. Because of this, there is a continuing high reliance on food aid and concessional sales.

Canada's food aid program has been increasing year by year and at the current level of some \$100 million, is an important contributor to the total movement of certain Canadian agricultural products. But this is really a relatively small item, since agricultural and food exports total \$1.6 billion a year.

The Trend to Rapid Adoption of Technological Changes

Any examination of the flow of international trade will show the rapid changes taking place in the volume, value and product content of the agricultural sector. In the developed countries, this is reflected in the increased demand for new convenience products for consumption in the home, and for portion packs in the hotel, restaurant and institutional trade.

With the newly developed ability to deliver such products to world markets at reasonable cost through high frequency air cargo service, containerized shipping, improved inland transportation and handling, these convenience products will increasingly shape the future of world trade.

Other countries, too, are quickly moving away from their traditional foods to the packaged, convenience foods of North America. A prime example is the sharply changed dietary habits in Japan, where people now import large quantities of wheat, despite a surplus of rice, and are rapidly developing a demand for dairy products, frozen vegetables, and specialized meat cuts.

The developing countries are showing a similar trend for quick adoption of technical change but with some difference in emphasis. Their agricultural production in many cases has moved from the primitive to the modern in a few short years. For example, Mexico has changed from a wheat importer to an exporter within the decade. Pakistan has indicated that they anticipate an exportable surplus of cereals, and India is exporting sugar.

Another aspect of technological change worthy of careful note is the increased substitutability which agricultural products now face from synthetics. Technologists now have the ability to derive even larger numbers of end-products from simple basic materials. The advent of filled milk products, soya-bean substitutes for meats and petroleum-based sources for protein, provide current examples. In the case of grains, this has also shown up in the desire of developing countries to have their own flour mills and to import wheat, not flour. This has been a rapid and continuous process since the late 1950's in all the countries which grow little wheat themselves.

These developments are being superimposed on the general trend towards a lessened demand for cereals and starchy foods in favour of high protein products, which in turn can be correlated to improved standards of living and purchasing power. It all adds up to an extremely complicated demand outlook, but certainly a weakened position for growth in demand for Canadian wheat and flour.

The Trend Toward Concentration of Decision-Making in Agricultural Trade

Evidence of this consolidation appears in most aspects of our agricultural trade and yet it is seldom taken fully into account in examining trading conditions.

It is reflected in the socialist countries with their state trading organizations, able to direct and re-direct large volumes of trade on short notice, and in response to political, as well as economic, factors.

In the developing countries, too, where balance-of-payments problems frequently require imports to be rationed, major decisions affecting the source and type of commodity imports are often vested in state banking or development corporations. In many cases, these same developing countries qualify for some form of economic assistance and here again, the final decision will likely be made by executives in a governmental agency.

The same trend exists in the developed countries where there is a steady concentration of commercial purchasing power into fewer hands through international combines and company integration. The mass purchasing technique of today's executive in a hotel, restaurant, or supermarket chain bears little resemblance to the decisions previously made by managers of single-unit outlets. A similar regrouping is taking place in major world markets and can greatly influence our trade.

Conclusion

These are some of the features of the agricultural climate in which the Canadian food system and grains, in particular, must operate. These are features that operated last year and exist this year, and will continue into the future. In spite of many efforts to make changes in these constraints, Canada has had little success. Perhaps I can bring home the significance of the persistence of these problems by indicating that I am indebted for many of my specific comments to a paper written two years ago. It is still valid because the same trends exist—in some cases even stronger.

What of the longer term future? Very bluntly, I see very little being different five or ten years hence. On the plus side, there will be more people in Canada with higher incomes, but they will consume less bread. They will spend a little of their extra money on food, but the food will be red meat, fruit and vegetables, and processed food, not bread. For exports, there will be more people in the world with more money. However, the European Economic Community will probably be larger and more self-sufficient than now. Australia will be just as competitive as ever, and so will the U.S. The U.S.S.R. will likely have a stronger agriculture, higher incomes, lower per capita consumption of bread and higher consumption of meat. Technological advances will continue to raise farming productivity in all countries. This a bleak outlook but I believe it is realistic.

Canada has maintained the level of its farm exports to its traditional markets in the developed countries in the face of widespread government intervention in the export and import of farm products. Canada has done so without the widespread use of price supports or export subsidies and this reflects the gains in efficiency by resource adjustment within Canadian agriculture. Similar gains will be required in the future just to maintain present levels of exports because it is unlikely that we will be able to expand exports substantially to other developed countries. The essential long-term determinants of agricultural trade, i.e. world population and income growth, indicate a basic potential for expanding markets — providing our own policies are operated in such a way as to permit our products to compete.

If Canadian commodities are competitive in quality, availability and price and our marketing programs are organized effectively, we can obtain a good share of the potential world food and agricultural trade, in spite of the severe obstacles that are in our path.

At press time, returns are still trickling in from our readers. The questionnaire was designed by Management Services and the Chief of Economic Communications, Economics Branch, CDA. We originally wanted to develop two-way communications, find out who our readers are, what they wanted to read in CFE, and update our mailing list. Over 600 addresses required changes.

The questionnaire was not fully scientifically designed. As a result, an analysis of the returns does not provide scientific conclusions.

Here is a brief interpretation of the results. We received replies from 2,011 of our English readers—55 percent, a good response. Many institutions and libraries receive multiple copies and extension workers usually do not reply—they receive so much paper. Most of the responding readers live in Ontario, with the Prairie provinces and foreign countries being the second and third largest groups. We had intended a survey of French language readers as well but had a problem with the use of words and communication in the questionnaire. We still plan on conducting a survey of French readers of which there are about 1,500.

The major reader groups, in order, are administrators, farmers, economists and extension workers.

Farmers have the most varied opinions. For example, more farmers than economists think that CFE is "very good". This pattern carries throughout the survey, perhaps indicating the more specific interests of farmers.

Market outlook, farm management, policy developments, demand projections and marketing boards are the most wanted topics for articles.

The survey shows that readers would like to see the statistics page included, but not expanded. The most popular statistical items are: indices of farm prices; marketings of grain, livestock and poultry; amounts of various farm products in storage; indices of food and consumer prices; exports and imports of grains and other commodities.

The "Bouquets" far outweighed the "Beefs". In general, we are encouraged by the response to the survey.

Thank you for taking part. You have helped us to improve future issues of this publication. The managing editor welcomes your letters and other forms of communication.

NAME _____

ADDRESS CHANGE _____

Now is the time to renew your free subscription to our publication. A reply before January 28, 1977 will automatically renew your subscription.

1. THE ADDRESS AS SHOWN ABOVE IS
1,321 Correct 620 To be changed as indicated above

2. I WISH TO CONTINUE RECEIVING "CANADIAN FARM ECONOMICS"
1,911 Yes 100 No

Signed _____ Date _____

3. MY OCCUPATION IS: (CHECK THE ONE WHICH MOST APPLIES)

312 Farmer	313 Economist	72 Communications Media
(also check one below)	418 Administrator	(also check one below)
176 Grass or silage	277 Extension Worker	49 Editor or Reporter
54 Fruits or vegetables	113 Marketing Representative	9 Working for daily paper
141 beef	148 University Teacher	10 Working for farm weekly
59 pork	78 University Researcher	15 Working for farm magazine
46 dairy	28 University Extension	8 Working for agency publication
45 poultry	53 Student	18 Radio News and Information
		11 Television News and Information

Your opinions, comments and information on how you use the publication are needed in order to help us to make further improvements.

You are asked to check one reply for each question.

4. ON THE WHOLE, HOW GOOD DO YOU THINK "CANADIAN FARM ECONOMICS" IS?
586 Very good 977 Fairly good 76 Passable 8 Not very good 3 Terrible

5. ARE THE CONTENTS OF "CANADIAN FARM ECONOMICS" TIMELY?
1,200 Yes 35 No 164 No opinion

INFORMATIVE ENOUGH? 1,245 Yes 56 No 89 No opinion

RELATED TO YOUR INTERESTS? 1,243 Yes 73 No 91 No opinion

6. HOW ABOUT THE AMOUNT OF: DETAIL? 120 Too much 1,219 About right 87 Too little 71 No opinion

TECHNICAL INFORMATION? 135 Too much 1,053 About right 160 Too little 113 No opinion

PUBLICATION REVIEW? 44 Too much 913 About right 254 Too little 225 No opinion

(over)

409 Credit	405 Marketing opportunities abroad	258 Production of grain
654 Farm Management	302 Marketing of beef	144 Production of other crops
225 Food Consumption	155 Marketing of pork	377 Projections for supply
239 Food Costs	83 Marketing of poultry	518 Projections for demand
148 Dairy Marketing	71 Production of poultry	519 Policy Developments
315 Grain Marketing	140 Production of fruits and vegetables	325 Program Developments
423 Marketing Boards	276 Production of beef	315 Tariffs and Trade
774 Market Outlook	159 Production of hogs	267 Trade Agreements

8. IS "CANADIAN FARM ECONOMICS" READ IN THE SAME WEEK AS RECEIVED?
649 Regularly 846 Sometimes 21 Never

9. PERCENTAGE OF CONTENTS READ
171 100% 840 50% 347 25% 65 10%

10. AFTER READING "CANADIAN FARM ECONOMICS", IT IS:
1,209 Filled 109 Discarded 298 Passed along

11. IF FILED, REFERENCES ARE MADE:
178 Regularly 1,104 Sometimes 34 Never

12. NUMBER OF OTHER PUBLICATIONS RECEIVED WEEKLY
549 5 or less 515 10 250 20 66 60 110 120 or more

13. AVERAGE TIME SPENT WEEKLY READING THESE PUBLICATIONS:
191 1 hour 352 2-3 hours 398 3 hours 199 10 hours 47 20 hours

14. DO YOU MAKE USE OF THE STATISTICS PAGE ON INSIDE OR BACK COVER?
195 Frequently 1,087 Occasionally 203 Never

15. WOULD YOU LIKE TO SEE THE STATISTICS PAGE EXPANDED?
576 Yes 615 No

16. CHECK OFF THE FOLLOWING STATISTICAL DATA OF A CURRENT NATURE THAT WOULD BE MOST USEFUL TO YOU:

421 National income in current and constant dollars	358 Sales of new machinery and repair
608 Indices of food and consumer prices	645 Marketings of grain, livestock and poultry
512 Employment and unemployment	235 Production of dairy products and eggs
565 Indices of prices paid and received by farmers	567 Exports and imports of grains and other commodities
527 Farm cash receipts	402 Wheat supplies in major exporting countries
634 Amounts in storage of grain, meats, dairy and poultry products, and eggs	

17. COMMENTS (BEEFS AND BOUQUETS) AND OTHER SUGGESTIONS

POLICY AND PROGRAM DEVELOPMENTS

Agricultural Stabilization Act (Wool Price Stabilization Order)

The Agricultural Stabilization Board will make payments to producers who delivered at least 100 pounds of wool, other than Reject grades, from April 1, 1970 to March 31, 1971. The Board will pay producers the difference between the base and prescribed prices. The Board has established the base price at 38.92 cents a pound and the prescribed price at 115.6 percent of the base price. (March 30, 1971).

Alberta Crop Insurance Amendments

Presently there is insurance on wheat, oats and barley, peas for processing and rapeseed. Insurance of flax and beans for processing will be added in 1971.

The amendments agreed upon by the Federal and Provincial Ministers of Agriculture will change the coverages and rates to keep the insurance scheme self-sustaining, and will reduce the established price for insurance of grains. In 1970, 12,862 Alberta farmers purchased \$31,951,000 of insurance coverage and were paid \$1,700,000 in indemnities. Since the crop insurance program commenced in 1965 total premium income has been \$15,400,000 and total indemnities paid has been \$15,000,000.

The agreement also provided for changes in the contract with the insured and for amendments to the sections on reinsurance.

Finally, the agreement replaces Schedules A, B, C, with revised Schedules to up-date the levels of coverage, the terms of insurance, and the premium rates to be charged.

Federal contributions to Alberta in 1969-70 fiscal year were \$986,219 for premiums and \$318,789 for administration. The Federal government also paid Alberta \$1,576,139 under the reinsurance agreement due to the high indemnities paid with respect to the 1969 crops. (April 6, 1971).

Feed Freight Assistance Program

The rates of assistance under the Feed Freight Assistance program for the 1971-72 fiscal year will be maintained at last year's levels, except in a few self-sufficient areas. In these areas the program becomes less important as the need for outside supplies decreases.

Since April 1, assistance on Western feed grains shipped into southwestern Ontario has been reduced from \$4.20 to \$3.20 per ton. A progressive reduction

in the level of assistance in this area is planned. Shipments of Ontario wheat and corn received freight assistance when moved to the Atlantic provinces.

Assistance on grain shipped into the Creston-Wyndell area of B.C. has been removed because this region has been designated a self-sufficient feed grain area.

The rate of assistance on shipments of Ontario grown wheat to Quebec and the Atlantic provinces has been placed on the same rate basis as shipments of Ontario corn, that is \$6.00 less than the rate paid on shipments of western grain to these areas.

Changes in transportation costs account for minor adjustments in the rates of assistance to Nipissing District in Ontario and to the counties of Charlevoix, Richelieu and Chambly in Quebec.

Dairy Support

Beginning April 1, 1971, the Canadian Dairy Commission will pay subsidies on manufacturing milk and cream, under its quota system, at the same rate as last year. It will also offer to buy milk powder at 24 cents per pound, cheese at 51 cents and butter at 65 cents per pound.

The Minister of Agriculture, the Honourable H. A. Olson, making his statement in the House of Commons, pointed out that the actual prices received by producers from the market are a matter of provincial jurisdiction.

In provinces not under market sharing quotas, there will continue to be a levy or holdback from the subsidy payments, while in provinces now under market sharing quotas, producers will receive a subsidy at the full rate for the milk or cream for which they are eligible.

The cost of disposing of the skim milk powder surplus, the major surplus Canadian dairy product, and the rate of levy necessary to finance that cost, is related primarily to the price which can be secured for skim milk powder exports. These costs and the rate of levy are not known yet, but there has been marked improvement in skim milk powder export prices over the past year.

Meanwhile, the holdback from producer payments will, with one exception, continue at present levels.

The exception is that the levy of one cent per pound of butterfat on cream deliveries by a producer up to his quota will be discontinued.

Agricultural Products Marketing Act (Ontario Milk Order)

The Ontario Milk Order was amended so that the word "Board" will mean both the Ontario Milk Marketing Board, and the Ontario Cream Producers' Marketing Board. (March 23, 1971).

(Ontario Cream Producers' Marketing Levies Order)

The Ontario Cream Producers' Marketing Board pursuant to the above-mentioned Ontario Milk Order issued an Order providing for the fixing, imposing and collecting of levies from certain cream producers.

The amount of the levy has been set at the rate of \$0.5028 for each pound of over-quota milk-fat.

The plant operator will deduct all levies payable by the producer to the Board.

Here "cream" means cream delivered to a plant for manufacture into creamery butter; "plant" means a cheese factory, concentrated milk plant, cream receiving station, creamery, dairy or milk receiving station; and "quota" means a quota in pounds of milk-fat, fixed and allotted to a producer by the marketing board in relation to the volume of sales of cream by all producers. (April 1, 1971).

Dairy Agreement Signed with Ontario Cream Producers' Marketing Board

The Canadian Dairy Commission announced that the Ontario Cream Producers' Marketing Board has now joined with other boards and agencies from Ontario and Quebec and has become a signatory to the Interim Milk Marketing Agreement, effective April 1, 1971.

All producers of industrial milk and cream in both Ontario and Quebec, as well as all milk from fluid producers which is used for manufacturing purposes are now under market control. (April 2, 1971)

Ontario Tender Fruit Order

The former "Ontario Tender Fruit Growers' Marketing-for-Processing Order" will from now on, be referred to as the "Ontario Tender Fruit Order".

The Board has been authorized to fix, impose and collect levies from persons engaged in the production

or marketing, locally, within the Province, or for interprovincial and export trade of any tender fruit named hereafter: a) Bartlett pears; b) cherries; c) Kieffer pears; d) peaches; and e) plums.

Tender Fruit	Maximum Levy per ton
1. Bartlett pears	\$4.00
2. Cherries	\$4.00
3. Kieffer pears	\$2.00
4. Peaches	\$2.00
5. Plums	\$2.00

(May 4, 1971)

Prairie Farm Assistance Act (Levy Discontinued)

The Prairie Farm Assistance Act levy on all grain marketings after July 31, 1971 will be discontinued. Even though the levy will not be collected, the assistance under the PFAA will be continued in all areas for the 1971 crop, and for the 1971 crop where crop insurance is not available. Since crop insurance provide farmers with better protection against disaster than does PFAA, and with the extension of crop insurance to all areas of the prairies, PFAA will be no longer necessary.

The Prairie Farm Assistance Act was passed in 1939 and applies to the Prairie Provinces and the Peace River District of British Columbia. A one percent levy has been collected from farmers on all prairie grain marketings since the Act was passed. The object of the Act has been to provide direct financial assistance to farmers in an area suffering a crop failure.

Crop insurance, insures crops on an individual farm and crop basis while PFAA operators on the basis of area yields. Crop insurance is now available to all farmers in Manitoba, to practically all farmers in Alberta, and to a majority of farmers in Saskatchewan.

All areas of the prairies should be covered by crop insurance by 1973 when the Prairie Farm Assistance Act will terminate. (April 29, 1971)

Final Payments to Nova Scotia Barley and Oats Producers

Following agreements covering the marketing of barley and oats produced in 1970 in the Province of Nova Scotia, Malagash Grain Limited have submitted statements which show that the proceeds from the sale of barley and oats exceed the advances

made to primary producers, plus carrying cost, in sufficient amount to permit the distribution by Malagash of final payments to producers.

The final payments distributed to producers will be the following: \$22.01 per ton of barley respecting sales of 506,2050 tons of barley, and \$25.80 per ton of oats respecting sales of 19,5915 tons of oats. (March 23, 1971)

Agricultural Products Board Act (British Columbia Apple Concentrate)

A modification has been brought to the Order in Council authorizing the Agricultural Products Board to purchase up to 130,000 gallons of British Columbia apple concentrate. The authorization of purchase was modified to allow the Board to buy either apple concentrate or its equivalent in single strength apple juice. (April 20, 1971)

Farmers Borrow Less From FCC

Farmer demand for long term mortgage funds from the Farm Credit Corporation was less during the fiscal year ended March 31, 1971 than in the previous year.

Figures show that 4,117 loans under the Farm Credit Act amounting to \$115,213,000 were approved during the 1970-71 period. This compares with 5,829 loans valued at \$160,466,000 approved during the preceding year.

The largest portion of the loan decline is reflected in the amount borrowed to purchase land. Reasons for this are seen as (1) the unwillingness of some farmers to expand their business during a period of uncertainty in the agricultural industry, and (2) the lack of opportunity in the economy for low-income farmers to find satisfactory alternatives for earning a living and thus a reluctance to sell their properties.

Interest rate under the Farm Credit Act was $8\frac{3}{4}$ percent for the first six months of the 1970-71 fiscal year. It dropped to $8\frac{1}{2}$ percent for the last six months.

Starting April 1, 1971 a *new interest rate* of $7\frac{3}{4}$ percent was introduced, on loans made under the Farm Credit Act. Under the Farm Syndicates Credit Act the new rate is seven percent, a decrease of one percent from the previous rate.

World Food Program's Election

Mr. Frank Shefrin, Director of the Canada Department of Agriculture's International Liaison Service,

was elected chairman of the Intergovernmental Committee of the World Food Program, during a committee meeting on the 29th of March. He has served as vice-chairman for the past year and has served as Canada's representative on the Committee since the World Food Program began operations in 1963. The WFP is an international agency controlled jointly by the Food and Agricultural Organization and the United Nations.

WFP projects use food aid to promote development of human resources, public health programs, improved housing and public amenities, transportation and communications, agriculture and industry in developing countries.

Canada, which has contributed nearly \$100 million in cash and foodstuffs since the start of the program, is second only to the United States in degree of participation. Canadian foodstuffs—wheat, flour, powdered eggs, powdered skim milk, canned cheese, beans, peas, dried and canned fish—have gone to more than 60 countries to assist in 180 projects.

Farm Adjustment Program

Agriculture Minister H. A. Olson met with the provincial ministers of agriculture on the 26th of March to discuss a proposed nation-wide farm adjustment program. Proposals were made to a) assist farm people in developing commercially viable farm businesses and b) to help other farm people take advantage of non-farm income, employment and retirement opportunities. The ministers discussed ways and means of resolving these problems through an agricultural adjustment program. The federal proposal is outlined in an article titled *Agricultural Adjustment or Development Policy for Canadian Agriculture: a Proposal*, and is available from the Information Division, Canada Department of Agriculture, Ottawa, Ontario, K1A 0C5.

WHAT IS HAPPENING ABROAD IN POLICY AND PROGRAM DEVELOPMENTS

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Canadian Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

Europe—Dairy Products

The downward trend, which had characterized the development of cow numbers in some European countries in 1969 continued during 1970. Govern-

mental measures to promote the slaughtering of dairy cows were one factor influencing the trend, but unfavourable pasture conditions also had some impact, particularly in the northern parts of Europe. In some countries, however, cow numbers increased in 1970.

Milk deliveries declined in most northwestern European countries in the first part of 1970, compared with the same period of 1969, particularly in the Nordic countries. In the EEC, the situation varied from country to country (only the Netherlands showed a clear increase in milk deliveries), and this was also the case in eastern Europe.

Butter production has decreased in most countries in the latter part of 1969, and this decline was accentuated in 1970, mainly because of reduced milk deliveries and rather favourable marketing conditions for other dairy products. In Austria, the Netherlands and the United Kingdom, butter production rose in the first half of 1970, whereas in Denmark, Finland and Sweden the decline reached 12 to as much as 30 percent. Because of lower production, larger domestic sales, and some trade recovery, butter stocks decreased markedly in most countries of northwestern Europe, particularly in the EEC. The heavily subsidized butter prices on the world market remained stable.

Because of good demand cheese production remained at a high level. With the exception of Italy, output rose markedly in the Community, and also in Finland, Britain and the USSR. In the first half of 1970, factory production declined slightly in Denmark, Ireland and Poland. Cheese trade continued to expand and export prices pursued an upward trend.

Following a period of considerable overproduction, the output of skim milk powder started to fall in 1969 and declined further in the first half of 1970, Denmark and Britain being among the exceptions. Reduced production, various measures to increase domestic utilization for feed, and some expansion of trade brought a pronounced reduction of surplus supplies in a number of countries, especially in the EEC. As a result of this development and the agreement on a minimum export price in the framework of GATT, world market prices of skim milk powder showed a stable tendency during 1970. [Report of the Committee on Agricultural Problems on its 22nd Session, held in Geneva in January 1971, Economic Commission for Europe, U.N. Economic and Social Council]

Butter Production

Butter production in the OECD countries during the quarter ending March 1971 closely reflects the pattern of 1970, with reduced output almost everywhere. Butter stocks in Europe have been considerably reduced, but most producing countries continue to give priority to cheese, rather than butter. In the EEC, production in the Netherlands remained at the 1970 level in January, and fell by four percent in February, with a two percent drop expected in March. Even more significant was the drop of nine percent reported by Germany for the first quarter. Belgium followed a similar trend in January but forecast smaller declines in the following months. In France, however, after a decline of only one percent in January, production is recovering again.

Elsewhere, butter production mainly reflects the milk production situation, with sharp decreases in Denmark, Finland, Ireland, Switzerland, Canada and New Zealand. Except in Canada, production in these countries in 1970 was also below the preceding year's level, and a comparison with 1969 is thus of interest. The following table shows the butter production, in thousand metric tons, for the first quarters of 1969, 1970 and 1971 with, in brackets, the percentage changes when compared with 1969:

	1969	1970 first quarter	1971
Denmark	34.1	31.7 (- 7)	29.4 (-14)
Finland	20.1	17.9 (-11)	14.6 (-27)
Switzerland	7.0	6.8 (- 3)	6.3 (-10)
Ireland	5.9	5.4 (- 8)	5.2 (-12)
Canada	22.6	23.4 (+ 4)	19.1 (-15)
New Zealand	90.2	65.0 (-28)	58.6 (-35)

Milk Powder Production

With the exception of Finland and Britain, production of whole milk powder in 1970 followed the trend of milk deliveries. Countries with increased milk deliveries in 1970, e.g., Austria, Iceland and Japan, also increased their output of whole milk powder. In Britain, however, less whole milk powder was produced, despite higher milk deliveries. In other countries — Belgium, Germany, Denmark, Sweden and Switzerland — reduced milk production was reflected in a lower output of whole milk powder, but in Finland there was a sharp increase in the make of powder.

The reduced butter production has also led to a reduced output of skim milk powder. The reduction was particularly large in France (26,000 tons),

Canada (15,200 tons), Finland (9,000 tons), Belgium (4,900 tons) and Germany (4,800 tons). A higher butter output in Britain, Japan and, marginally, the United States led to a higher output of skim milk powder (4,100 tons, 4,500 tons, and 24,200 tons respectively).

The 1971 U.S. Dairy Outlook

Prospects for 1971 favor a limited rise in milk production. The plus factors include a good supply of herd replacements, a relatively eased dairy labor situation, and record-high milk prices. On the other hand, grain and concentrate prices are up and, with other production costs rising, net income from dairying may show little growth.

Herd replacements on hand at the beginning of 1971 were 31.7 per 100 cows, slightly above last year. Though the current and prospective prices for slaughter cows are fairly high, the decline in milk cow numbers likely will continue to be small. This strongly indicates a gain in milk output this year, since milk output per cow has risen more than 1.5 percent each year since 1952. The annual increase for 1965-70 averaged 2.5 percent.

The recent increases in national unemployment have made more labor available for dairying. The unemployment rate will likely continue relatively high in coming months, but may decline if economic activity picks up as expected. Apparently, less favorable off-farm employment opportunities helped slow the decline in numbers of dairy farms and milk cows.

Price gains may be less in 1971 than in 1970, while production costs likely will rise nearly as much. Milk prices farmers received have set new records since 1965 and price gains from that year's level were 34 percent. Though farmers sold less milk, they grossed about 30 percent more income from dairying in 1970 than in 1965. However, production costs rose substantially last year and limited gains in net returns. Also, damage to the 1970 corn crop and the large feed grain requirements for livestock raised dairy

ration prices sharply. [USDA. Economic Research Service. Dairy Situation, March 1971]

Britain—Interim Import Levy Scheme for Cereals

New minimum import price and levy arrangements, starting July 1, will be based on variable general levies, according to the difference between the lowest representative offering prices and the relevant minimum import prices. These arrangements pertain to all cereals and cereal products, excluding rye and rice. Corn, for industrial uses, will be free of a levy; denatured wheat, flour not suitable for human consumption, and malting barley of high diastatic quality will bear minimum import prices.

The current level of minimum import prices will be raised, on the average, by £3.50 per long ton, starting July, 1971 and going on until July, 1972; and for the August-December 1972 period by an amount that, for the whole 1972-73 crop year, would exceed the current levels by an average of £6.00 per long ton. Minimum import prices will rise seasonally from August to July, so as to encourage orderly marketing. The range of variations between lowest and highest prices will be £3.00. [Canadian Commercial Officer (Agriculture), London]

Vegetable Surplus in Britain

The mild weather has created vegetable surpluses in Britain. More than 5,000 acres of brussels sprouts are now being ploughed in and up to a million tons of potatoes are likely to meet the same fate. Mild weather and increased acreages have combined to bring about record low prices for vegetables—many vegetables, in fact, are selling at half last year's wholesale prices.

Among those to suffer are the processing vegetable firms that are being left with large stocks, as housewives take advantage of low prices for fresh products. Many growers have had contracts for next season cut by 10 percent. [Canadian Commercial Officer (Agriculture), London]

PUBLICATIONS

Economics Branch Publications

Agricultural Statistics for Canada. Economics Branch Canada Department of Agriculture, Ottawa, April 1971, Pub. No. 71/6.

Legislation—Changes in Provincial Legislation in the Prairies, 1970. T. F. Joyce, Prairie Regional Office, Economics Branch, Canada Department of Agriculture, Torwest Tower, Regina, Saskatchewan, 1971. Pub. No. 71/5. pp. 177-219. This publication is the fourth supplement to the booklet entitled "Agricultural Legislation in Western Canada, 1966". It also includes a consolidated Index.

Prairie Regional Studies in Economic Geography. No. 5—The Weyburn Region of Saskatchewan. Prairie Regional Office, Economics Branch, Canada Department of Agriculture, Torwest Tower, Regina, Saskatchewan, 1971. Pub. No. 71/4.

Publications '70. A list of material published in 1970 by the Economics Branch, Canada Department of Agriculture, Ottawa, 1971. Pub. No. 71/3.

Canada Department of Agriculture Publications. Available from Information Division, CDA, Ottawa, Canada, K1A 0C5

The Lighter. Quarterly Vol. 41, No. 2, Spring 1971, pp. 30. Mechanization to combat rising tobacco production costs. Free. Cat. No. A27-10/41-2.

Other Publications

Grain Policy. Releases on developments and proposals made by the Minister Responsible for the Wheat Board concerning the Prairie Grain Stabilization Plan (Bill C-244), the proposed changes to the Canadian Wheat Board Act (Bill C-238), and the Prairie Grain Advance Payments (Bill C-239), may be obtained by writing to: The Office of the Honourable Otto E. Lang, Minister Responsible for the Canadian Wheat Board, West Memorial Building, Wellington Street, Ottawa.

The Report of the Canadian Grain Marketing Review Committee. Submitted to the Canadian Wheat Board, 423 Main Street, Winnipeg 2, Manitoba, 1971. pp. 52.

Ontario Annual Report of the Minister of Agriculture and Food. For the fiscal year ending March 31, 1970. Toronto, 1971, pp. 251.

Canada Grains Council Technical Mission Report: 4 reports namely:

Feed Grain Technical Mission Report: South-East Asia.

Feed Grain Technical Mission Report: Caribbean.

Feed Grain Technical Mission Report: South America.

Feed Grain Technical Mission Report: Central America.

published by the Canada Grains Council, Suite 200, 177 Lombard Ave., Winnipeg 2, Manitoba, March 1971.

Tradition and Transition. Extension Education for the Farm Unit in a Changing Society. Prepared by Farm and Ranch Management Consultants, Ltd. for the Alberta Department of Agriculture, December 1970, Charts. Paper Cover. *Tradition and Transition* is a study of all Agricultural Extension Services in Alberta, with new directions charted for 1980.

Outlook for Saskatchewan Agriculture '71. A bulletin prepared by the Economics and Statistics Branch, Saskatchewan Department of Agriculture, March 1971, pp. 25. Tables.

Progenitors. Published by the Department of Industry, Trade and Commerce in co-operation with the Canadian Committee of Animal Breeders. Ottawa, 1971. pp. 20. Illus. Paper Cover. Also French, German, Spanish, Portuguese and Italian. Free. Cat. No. 67-1871.

Sources of Credit for Manitoba Farmers. Manitoba Department of Agriculture, Winnipeg, 1971. A revised edition of the provincial agriculture department's guide to farm credit sources has been published and is now available to farmers through local extension officers.

Agricultural Marketing and the EEC. Michael Butterwick and Edmund Neville-Rolfe, Hutchinson & Co. Ltd., London, 1971, pp. 300. This book is the result of a study sponsored jointly by the Home-Grown Cereals Authority and the Meat and Livestock Commission. The possibility of early British entry into the EEC makes this book useful reading for all those involved in agriculture and its associated industries and trades.

The following publications are available from the Publications Distribution Unit of the Dominion Bureau of Statistics, Ottawa 3.

Statistical Observer. Quarterly. Issued by "The Statistics Use and Information Services Group". D.B.S., Ottawa, Vol. 4, No. 1, April 1971. pp. 23. Also French. Free. Cat. No. 11-005. The *Statistical Observer* is a publication designed to inform economists, statisticians and related professionals throughout Canada about selected statistical and research developments undertaken in D.B.S., other federal departments and agencies, provincial departments, universities, and business and independent research organizations. The April edition outlines one of D.B.S.'s new projects, the "Post-Census Farm Survey and Quality Check", an independent sample survey of 11,000 farms that will follow the 1971 Census of Agriculture.

Intentions to Contract Acreages of Processing Vegetable Crops. D.B.S., Seasonal. 20¢ per copy. \$1.00 per year. Cat. No. 22-003.

Canada 1971. D.B.S., Ottawa, 1971. Pub. No. 11-203. Price \$1.50. Summarizing economic, social and cultural developments in Canada for general public use, this 320-page reference handbook is colourfully illustrated. It includes sections written by such experts as Professors Don Armstrong (The Economy), Timothy Cartwright (Urbanization), André Cailleux (Geography), Ramsay Cook (History), Pierre Dansereau (The Landscape) and Eugene Forsey (Government).

FAO and OECD Publications.

Available from Information Canada.

The Stabilization of International Trade in Grains. An assessment of problems and possible solutions. FAO Commodity Policy Studies. No. 20. Rome, 1970, pp. 68. Tables. Price \$2.50.

Foreign Investment Laws and Agriculture. FAO Legislative Series. No. 9. Hendersen, Julian. Legislation Branch, FAO, Rome, 1970. pp. 205. Price \$4.50.

Capital and Finance in Agriculture. Report adopted by the Committee for Agriculture and by the OECD Council, Vol. II, Country Studies, Agricultural Policy Reports. OECD, Paris, 1970. pp. 1120. Tables. Figures. Price \$15.00.

Studies of the Factors Influencing the Use of Cereals in Animal Feeding. OECD, Paris, 1971. pp. 210. Also French.

International Standardization of Fruit and Vegetables. Standard No. 1. Apples and Pears. OECD, Paris, 1970. pp. 510-572. Part IV. Pub. No. 47. Revised. Illus. Also French. Price \$5.25.

The Production and Marketing of Fruit and Vegetables in Mediterranean Countries. OECD, Paris, 1971. pp. 310.

Monthly Bulletin of Agricultural Economics and Statistics. FAO, Rome, Vol. 19, No. 12. December 1970. Articles on: National Farm Survey; Milk and Milk Products Situation: Effects of National Policy Changes in 1969-70. Statistical Tables on: production, external trade and prices. Vol. 20, No. 2, February 1971, Special feature on commercial fertilizers. Price \$0.60 per copy. \$6.00 per year.

Ceres. The FAO bi-monthly review. Vol. 4, No. 2, March-April 1971. pp. 68. Contains an article by Gunnar Myrdal, entitled "I have no respect for diplomacy in research", plus many other interesting articles. Book reviews. Illus. Also French and Spanish. Price \$5.00 a year.

CORRECTION

Volume 5, Number 6. February, 1971.

Page 7, Tables 6 and 7.

Acres should read thousand acres.

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HON. H. A. OLSON, MINISTER — S. B. WILLIAMS, DEPUTY MINISTER

Canadian Farm Economics is published bi-monthly by the Economics Branch, Canada Department of Agriculture, Sir John Carling Building, Ottawa, and is based on material prepared by economists of the Economics Branch.

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CANADIAN FARM ECONOMICS

ECONOMIC AND LEGAL DEVELOPMENTS IN NATIONAL FARM MARKETING LEGISLATION

The concept of national farm marketing legislation arose from the difficulties of Canadian farmers to achieve income equity under competitive conditions. Co-operatives and provincial marketing boards have achieved only limited success at stabilizing and raising commodity prices. As a result, Bill C-176 provides for the formation of national or regional marketing Agencies that would operate similar to public utilities in some aspects.

The substitution of regulation for competition in the area of farm production and marketing is not a new experiment in Canadian agriculture. The Western Canadian grain industries have been extensively regulated for many years. The concept will be new for some producers and some products. How extensively the principle of national marketing should be applied in Canadian agriculture in the years ahead is expected to remain a lively subject.



*Don Kidd**

INTRODUCTION

The proposed Farm Products Marketing Agencies Act (Bill C-176) has aroused more interest than is usual for new agricultural legislation. Bill C-176 has received a great deal of study in Parliament by the Standing Committee on Agriculture. The Minutes of Proceedings and Evidence are an important public record. During its consideration of the Bill, the Standing Committee received submissions and testimony from the Ministers of Agriculture, from representatives of producer organizations, the food industry and from other interested groups. These hearings were held in Ottawa and across Canada. On April 6, 1971, the Standing Committee returned Bill C-176, with several amendments to the House of Commons for further consideration.

In this article the approach towards the interpretation, analysis and implications of Bill C-176 will be strictly from the economic point of view, although many legal and political issues are also involved. Some of these issues are so interwoven that they cannot be treated separately. An example of one such

issue is the matter of inter-provincial trade in Canadian farm products.

HISTORICAL DEVELOPMENT

All of the provincial governments in Canada have enacted agricultural marketing legislation that provides for the establishment and operation of producer marketing boards. To illustrate, in the poultry products area, there are producer marketing boards for broiler chicken, eggs and turkeys operating in eight provinces. Each commodity group operates its own plan. There have been some attempts by provincial marketing boards to coordinate their efforts through national producer organizations such as the National Broiler Council, the Canadian Turkey Federation and the National Egg Council. In most cases, these attempts have been stymied by the reluctance of producers in one or two key provinces to support the marketing board principle.

The federal Agricultural Products Marketing Act was passed in 1949 to delegate federal powers to provincial marketing boards regarding shipments outside the province. The federal Marketing Act also allows for a levy on producer marketings to finance the marketing of products that are produced and consumed within the province.

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Under this joint legislative arrangement, producers have been able to organize and operate regulated marketing plans. Until the introduction of the regulations under the Egg and Fowl Producers Marketing Plan in Quebec, wholesalers were free to purchase their requirements either from the producer marketing board or from sellers outside the regulated area, that is, another province or country. This arrangement provided a reduced, although a substantial element of competition in the marketing system for the regulated product under the compulsory marketing plan.

LIMITATIONS OF ADMINISTERED MARKETING AND PRICING

The development of marketing legislation and of producer marketing boards allows for greater producer control of marketing and pricing decisions. Control is exercised by the marketing board rather than by individual producers. But even so, producer boards are not completely free to set their own terms and conditions of sale; they must meet the competition from outside the province and the competition from other products.

In addition, producer boards for most crop products do not have effective control of total supply. They may exercise some control over utilization. Whenever one or more submarkets exist for the regulated product, some advantage in higher returns may be gained by centralized control of distribution. The operations of the Canadian Wheat Board is an example of this arrangement.

THE ISSUES

Because of Canada's federal system of government, the delineation of federal and provincial jurisdiction in some areas of farm marketing is rather vague. As a result of Supreme Court decisions in the past, it is clear that Parliament has jurisdiction of farm product marketing in international and inter-provincial trade. The provincial legislatures may enact laws with respect to the marketing of locally produced products within the province. Whether or not the provinces may regulate the internal distribution of farm products originating from outside their province is a point in question at the present time. Processing in the recipient province further entangles questions of legality.

The basic question to be resolved is the extent to which regulated production and marketing will be more successful than competitive production and marketing in achieving an efficient, yet equitable,

system. We rely on the system not only to allocate resources, goods and services efficiently but to distribute incomes equitably. Many primary producers are dissatisfied with their relatively low and unstable income position relative to other segments of the economy. Many producers are prepared to accept greater regulation of production and marketing in return for the prospect of higher and more stable farm incomes.

While the opponents of regulated marketing appear less numerous than its proponents, opposition criticism has much validity. In the first place, there are many able producers who do not want their growth opportunities restricted by a marketing quota system. Many producers have the financial resources to withstand the temporary adversity of depressed prices that occasionally afflict commodity values. Some producers are sufficiently diversified to modify their production programs to minimize the impact of low prices.

On a more general level, some critics suggest that regulation inevitably leads to more regulation with a steady decline in efficiency of the system. The most common claim is that marketing boards will result in the balkanization of the Canadian food market. The trend towards both regional and farm specialization could be inhibited as a result of provincial quotas, with a corresponding increase in costs of production. As costs rise, there will be greater pressure from producers to raise prices in the high cost provinces. In the low cost areas of production, however, the pressure will be to raise quotas. The reconciliation of these issues in the past has been solved by competition; whether regulation could achieve better results remains to be tested.

The characteristics of supply and demand for the regulated product will determine the kind of marketing plan to be implemented by the national Agency. In the case of livestock and poultry products, the experience of producer marketing boards, would probably result in a quota control system. By means of quotas, production would be planned to avoid surpluses, as has been attempted, by the provincial producer marketing boards. In the case of field and horticultural products, where supplies are subject to natural variation, the marketing plan would probably provide for a multi-price system based upon the utilization of the product for particular uses. Because of greater differences in regional factors affecting crop production than livestock production in Canada, regional marketing plans appear more feasible than national marketing plans for crop products.

The reconciliation of divergent regional interests and among large and small producers will be a major obstacle to the development of marketing plans. At the provincial level, these issues have been settled by a referendum among eligible producers. The basis of representation is important in this respect. Voting rights may be either proportional to the number of eligible producers, to the relative volume of production of eligible producers or to a combination of both factors. In some cases, at the provincial level, it has been difficult to determine producer eligibility because under contract arrangements, the integrator company has claimed to be the producer.

This illustrates another of the basic objections to a marketing plan. It could freeze the development of mutually satisfactory marketing agreements between producers and their marketing firms. Whether marketing boards will be sufficiently flexible to incorporate beneficial innovations in marketing remains doubtful. There is very little provision under legislation to encourage innovation.

ORGANIZATION OF FOOD MARKETING

In several instances, producers have organized co-operatives in order to achieve a greater degree of control in marketing. The development of marketing boards has been in some instances a further development of the collective approach. The lack of outstanding success among producer co-operatives has influenced some of their members to seek the more protective umbrella of marketing board legislation.

Because of rapidly advancing technology, there has been a rapid decline in both the number of producers and in the number of marketing firms in some areas. As a result, it is likely that there has been increasing concentration of marketing power among fewer large firms in the marketing system of Canada. In Canada, investigations of concentration in the food industries have been limited to one or two particular inquiries. In the United States, a most comprehensive study was undertaken by the National Commission on Food Marketing who reported increasing control of marketing among fewer large corporations. Similar trends are evident in Canada.

The powers that maybe delegated to Agencies under Section 23 of Bill C-176 could permit the Agency to become a large scale marketing organization having all the powers of a corporate body. However, the Agency would not be a public corporation, and initial federal grants would be limited to a maximum

of \$100,000. Arrangements for additional financing are still uncertain.

OBJECTIVES

The objectives of the proposed Act are outlined clearly in Bill C-176, where in Section 22 it reads that "the objects of an Agency are to promote a strong, efficient and competitive production and marketing industry for the regulated products or products in relation to which it may exercise its power, having due regard to the interests of consumers . . .". In addition, Bill C-176 provides for the establishment of a National Farm Products Marketing Council whose duties are outlined in Section 6 as follows:

1. The duties of the Council are

- (a) to advise the Minister on all matters relating to the establishment and operation of agencies under this Act with a view to maintaining and promoting an efficient and competitive agriculture industry;
- (b) to review the operations of agencies with a view to ensuring that they carry on their operations in accordance with their objects set out in section 22; and
- (c) to work with agencies in promoting more effective marketing of farm products in inter-provincial and export trade.

2. In carrying out its duties the Council shall

- (a) consult, on a continuing basis, with the governments of all provinces having an interest in the establishment or the exercise of the powers of any one or more agencies under this Act or with any body or bodies established by the government of any province to exercise powers similar to those of the Council in relation to intra-provincial trade in farm products.

THE PROVISIONS OF THE BILL

The methods by which the Council and the marketing Agencies will achieve the objectives of the legislation are set out in three parts of the Bill. Part I, which deals with the Council, provides for its establishment, duties and powers and organizational form. The powers of the Council are largely investigative and advisory. Prior to a marketing

agency being established, the Council is required to hold public hearings to determine the merits, or otherwise, of establishing an Agency. In relation to any public hearing, the Council has all the powers of a commissioner under the Inquiries Act. Aside from its investigative role and advisory responsibility to the Minister, the Council may require the registration of producers and handlers of agricultural products. It may also require producers and handlers to keep records in such form as the Council requires.

Under Part II of the legislation, provision is made for the establishment, membership, objects and powers of the Agencies. The range of powers that may be delegated to a particular Agency by the Government are both extensive and substantial but are no greater than the powers available to present marketing boards under provincial farm marketing legislation. Provision is also made for the Agency to receive powers with respect to intra-provincial marketing under provincial legislation.

The authority to approve an Agency and its marketing plan has been delegated by Parliament to the Governor in Council under Sections 17 and 18 of the legislation. Similarly, amendments to marketing plans will also be made under these sections.

In the Interpretation section of the Bill, the definition of the marketing plan is a key element of the legislation. The marketing plan may provide for: (1) the definition of eligible producers under the plan (2) the scope and regulation of marketing and of marketing firms (3) the licensing of producers and handlers (4) the pooling of returns and (5) the collection of levies upon producers and handlers.

The responsibility under the Act for the development of a specific marketing plan is not sharply defined. It is the duty of the Council to determine that any proposed marketing plan is sound and feasible in relation to the objectives of the Agency. The Agency will operate on a day to day basis according to the guidelines of the marketing plan, and its operation will be subject to annual review by the Council, the Minister and by Parliament.

A number of more general matters with respect to the operation of the Agencies are outlined under

Part III of Bill C-176. For example, in Section 32 the Agencies are exempted from the provisions of the Combines Investigation Act. Provision is also made for the appointment and powers of Inspectors under the proposed law, and for the winding up or liquidation of Agencies.

SUMMARY

- (1) Producer co-operatives and producer marketing boards under present legislation have not been able to achieve the degree of marketing and price control that some producers desire. As a result, there was organized effort in support of national farm marketing legislation that would enable the formation of national or regional marketing Agencies.
- (2) The recent implementation of provincial regulations that restrict the distribution of products from other provinces or countries has temporarily, at least, reduced some producer interest in national legislation. Whether, these regulations are legal will be determined by the Supreme Court. However, this has clearly identified the dangers in an uncoordinated system of provincial approaches to farm marketing plans.
- (3) Bill C-176 provides for the establishment of a National Farm Products Marketing Council. The powers of the Council are investigative and advisory, and it is intended to act as a public watchdog of Agency operations.
- (4) The marketing powers that maybe delegated to Agencies are the responsibility of the federal and provincial Ministers of Agriculture and their respective Cabinets.
- (5) The Agencies will become a unique form of corporate organization, and their exact operating methods and financial structure has yet to be determined. The Agencies will administer the national or regional marketing plans, and thus, operating procedures and organizations will be related to the features of particular commodity marketing plans.

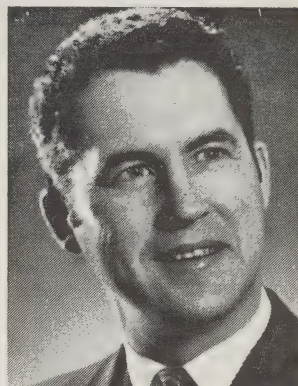
A LOCATION STUDY FOR HOG ASSEMBLY CENTERS IN ALBERTA



*James L. Dawson**

Assembly and transportation costs were \$1.40 per hog in 1970.

By reducing the number of assembly yards to 51, these costs could be reduced to \$1.00 per hog.



*Allan A. Warrack***

The success of any business or industry operating in a competitive economy is dependent primarily upon production efficiency and upon the operational and exchange aspects of market efficiency. As profit margins narrow, the effects of small reductions in production and marketing costs become increasingly important. The purpose of this study was to analyze some of the operational aspects of hog marketing. The objectives were: (1) to determine assembly costs as a function of the number of hog assembly locations; (2) to determine transportation costs as a function of the number of hog assembly locations; and (3) to determine the optimum number, size, and location of hog assembly locations in Alberta based upon information established in the first two objectives.

The objectives were based upon the hypothesis that assembly and transportation costs could be reduced through a reduction in the number of assembly locations. Fees for assembly and transportation in the existing hog assembly system often have little correspondence to volume, capital investment, or trucking mileage. The intent of the study was to identify ways in which assembly and transportation costs, combined, could be reduced.

This article is based on a unpublished M.Sc. thesis written by J. L. Dawson at the University of Alberta, Edmonton and on a technical research bulletin, *Location Analysis for Alberta Hog Assembly Centers*, distributed by the Department of Extension of the University of Alberta, Edmonton.

*Mr. Dawson is now working in the Marketing and Trade Division, Economics Branch, CDA, Ottawa K1A 0C5.

**Dr. Warrack is a professor of agricultural economics at the University of Alberta and was Mr. Dawson's thesis director.

SPATIAL MODEL AND ANALYTICAL PROCEDURE

In economic research, spatial effects are often overlooked. Economic justifications for spatial differentiation include economics of scale, transportation costs, the need for raw materials and markets, and the need for space itself. Beckman (1968, p. 3) noted that space enters economic relationships in two ways: (1) through transportation costs and (2) through neighbourhood effects. The neighbourhood effects include all social costs incurred by individuals, firms, and industries in adjacent territories. Compared to transportation costs, these social costs are difficult to measure and are often underemphasized in spatial problems. Because the social costs may outweigh the benefits created by the minimization of transportation costs, both costs must be considered.

Spatial Model

A long-run spatial model (LRSM) was utilized in the analysis. The LRSM used resembles, but extends, the linear programming transportation model. The linear programming model is designed to minimize aggregate transportation costs among a fixed number of supply and demand nodes. Normally, the analysis is for short-run situations, with no consideration given to the economies of each individual firm. The LRSM permits the number, size, and location of firms to vary so that costs may be minimized both for the aggregate and for the individual firm. Such a model is used primarily for long-run

planning and decision making. This general spatial model was developed in 1961 (Stollsteimer, 1961), and in 1967 Warrack devised suboptimization procedures allowing the model to be utilized in solving large-scale problems (Warrack, 1970).

Analytical Procedure

Seven basic steps were required to estimate the least-cost solution for the location, number, and size of hog assembly locations.

(1) Designation of supply areas and demand locations and their respective volumes. Fifty-eight census subdivisions were used to represent supply areas, and the three major slaughter centers represented demand locations.

(2) Selection of potential assembly locations and production reference points for each census subdivision. The locations of potential assembly centers performed a dual role in the study, acting as assem-

bly centers and also as supply reference points for the subdivision they represent. The objectives were: (i) to select towns near the center of subdivisions, and (ii) to select larger towns with established assembly volumes. Sixty locations were chosen to represent the 58 census subdivisions. With these 60 locations, the maximum distance any producer have to travel would be 30 miles. Assuming producers were distributed evenly throughout the area served by an assembly site, the average delivery distance would be about 15 miles.

(3) Development of a transportation matrix for the province. The following data were required: (i) road mileages between every production reference point and every potential assembly location, (ii) commercial trucking rates per mile for shipping hogs, and (iii) hog assembly volumes at each production reference point. To complete the transportation matrix, volumes from each production reference point were multiplied by transportation rates and mileages to each potential assembly location. The result was a 60 x 60 matrix.



(4) Analysis of assembly costs to establish a cost-to-volume relationship on a per hog basis.

(5) Application of a computerized solution procedure for the long-run spatial model. Transportation costs from production reference points to assembly locations, and assembly operational costs, were calculated as a function of the number of assembly locations.

(6) Application of the linear programming transportation model to calculate transportation costs from assembly locations to slaughter centers as a function of the number of assembly locations.

(7) The total combined cost function was computed by adding the assembly costs, production reference point to assembly location costs, and assembly location to slaughter center transportation costs.

The total combined cost function may be stated as follows:

$TCC = TAOC + TFATC + TASTC$
with respect to the number of assembly locations,
where TCC = total combined cost

$TAOC$ = total assembler operating cost

$TFATC$ = total farm (production reference point)
to assembler transportation cost

$TASTC$ = total assembler to slaughter center
transportation cost.

The least-cost solution was represented by the minimum point on the total cost function.

TABLE 1 —TRANSPORTATION AND ASSEMBLY COSTS WITH RESPECT TO THE NUMBER OF ASSEMBLY LOCATIONS

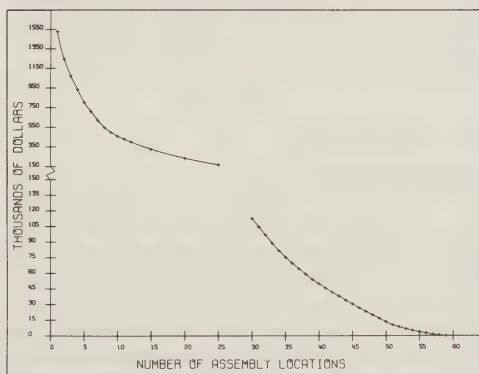
No. of Assembly Pts.	Operating Costs	Transportation Cost		Total Comb. Cost
		Prod'r- Assmbl'r	Assmbl'r- Packer	
1.	\$158,753	\$1,489,753	\$1,106,632	\$2,754,408
2.	160,853	1,215,352	663,197	2,039,402
3.	162,953	1,048,630	310,356	1,521,939
4.	165,053	913,565	506,763	1,585,381
5.	167,153	785,605	533,244	1,486,002
6.	169,253	695,396	673,817	1,538,466
7.	173,475	608,954	808,497	1,590,926
8.	175,575	537,485	938,104	1,651,164
9.	180,009	488,853	978,394	1,647,256
10.	184,063	450,458	1,015,228	1,649,749
11.	186,163	421,225	1,069,953	1,677,341
12.	191,277	393,533	1,084,757	1,669,567
15.	207,798	321,741	1,048,181	1,577,720
20.	218,716	232,476	1,065,119	1,516,311
25.	228,680	165,907	1,079,922	1,474,509
30.	240,668	112,826	1,080,134	1,433,638
31.	243,080	104,826	1,081,201	1,429,107
32.	248,300	96,893	1,089,028	1,434,221
33.	250,687	89,038	1,090,432	1,430,157
34.	252,417	81,810	1,090,432	1,424,659
35.	254,267	75,510	1,092,007	1,421,784
36.	256,097	69,838	1,092,890	1,418,825
37.	256,936	64,465	1,093,425	1,414,826
38.	257,801	59,235	1,098,329	1,415,365
39.	259,767	54,198	1,097,841	1,411,806
40.	263,884	49,967	1,097,841	1,411,692
41.	265,241	45,816	1,099,703	1,410,760
42.	266,068	41,799	1,101,041	1,408,908
43.	268,231	37,956	1,103,009	1,409,196
44.	269,959	34,142	1,103,518	1,407,619
45.	271,139	30,434	1,105,001	1,406,574
46.	272,396	26,778	1,106,814	1,405,988
47.	273,740	23,350	1,108,677	1,405,767
48.	275,121	19,941	1,108,677	1,403,739
49.	277,523	16,641	1,108,677	1,402,841
50.	279,140	13,349	1,109,875	1,402,364
51.	281,247	10,399	1,110,224	1,401,870
52.	283,038	8,440	1,111,832	1,403,310
53.	284,875	6,529	1,112,054	1,403,458
54.	286,243	5,027	1,112,429	1,403,699
55.	287,612	3,724	1,112,906	1,404,242
56.	289,392	2,536	1,113,159	1,405,087
57.	290,595	1,352	1,113,316	1,405,263
58.	291,680	624	1,113,050	1,405,354
59.	292,630	64	1,113,994	1,406,688
60.	293,612	0	1,114,058	1,407,670

TRANSPORTATION AND ASSEMBLY COSTS AS A FUNCTION OF THE NUMBER OF ASSEMBLY LOCATIONS

Farm to Assembler Transportation Costs

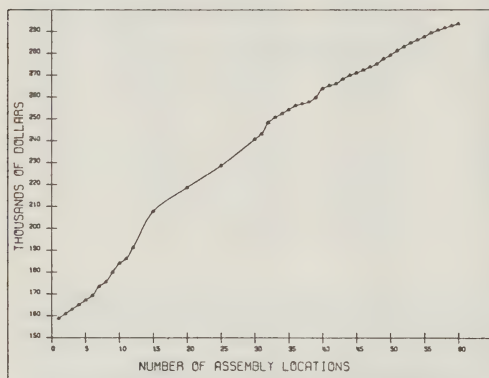
Farm to assembler transportation costs and production reference point to assembler costs were considered synonymous. The producers' costs of shipping to the nearest production reference point were not considered because of the variety of conditions and circumstances under which producers deliver hogs. The ensure uniformity, commercial trucking rates were used to represent producer shipping costs from production points of assembly locations. The cost function began at \$1,498,023 utilizing one assembly location and decreased with each additional assembly location (Figure 1 and Table 1).

FIGURE 1—PRODUCER TO ASSEMBLER TRANSPORTATION COST WITH RESPECT TO THE NUMBER OF ASSEMBLY LOCATIONS



Empirical results for the assembly operating costs ranged from \$158,753 for a single location to \$293,612 for sixty locations (Figure 2 and Table 1). Cost estimations for the first locations may be inaccurate inasmuch as firms handling such large volume do not exist. However, the likelihood of diseconomies of scale is slight. As more assembly locations were added, the volumes assembled corresponded more closely to the volumes used in deriving the assembly cost estimates for the analysis.

FIGURE 2 — ASSEMBLY OPERATIONAL COSTS WITH RESPECT TO THE NUMBER OF ASSEMBLY LOCATIONS



Assembler to Slaughter Center Transportation Cost

The transportation model was used to minimize shipping costs from assemblers to slaughter centers. Each assembly location was added in the order selected by the spatial model. The minimum cost occurred when the first assembly locations were allocated to or near the packing centers. As decentralization of assembly locations increased, shipping costs to the packing centers increased. These costs ranged from \$506,763 to \$1,114,058 for the sixtieth assembly location (Figure 3 and Table 1).

Total Combined Costs

The total combined costs (TCC) function was obtained by the vertical summation of the following three cost functions: producer to assembler transportation costs, assembly operational costs, and assembler to slaughter center transportation costs. For the first 11 assembly locations selected by the spatial model, the TCC function fluctuated. This fluctuation was due largely to the effect of the as-

sembler to slaughter center transportation cost function. After the addition of the eleventh assembly location, the TCC function descended to the least-cost solution, which used 51 assembly locations. The TCC function increased slowly after the least-cost solution was reached. The TCC varied from \$2,754,408 for one assembly location to \$1,401,870 for the least-cost solution (Figure 4 and Table 1).

FIGURE 3 — ASSEMBLER TO PACKER TRANSPORTATION COST WITH RESPECT TO THE NUMBER OF ASSEMBLY LOCATIONS

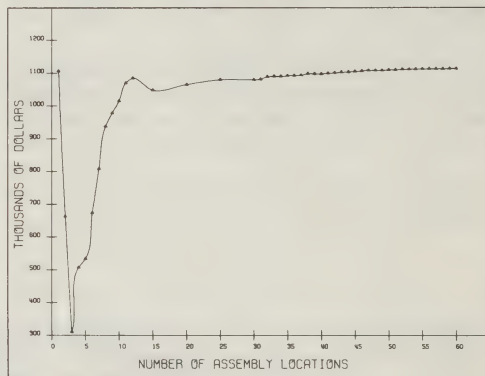
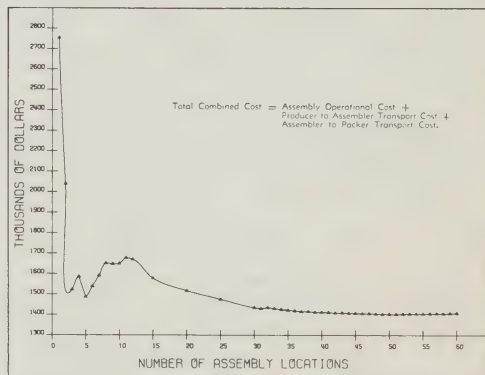


FIGURE 4 — THE TOTAL COMBINED COST WITH RESPECT TO THE NUMBER OF ASSEMBLY LOCATIONS



INTERPRETATION AND IMPLICATIONS

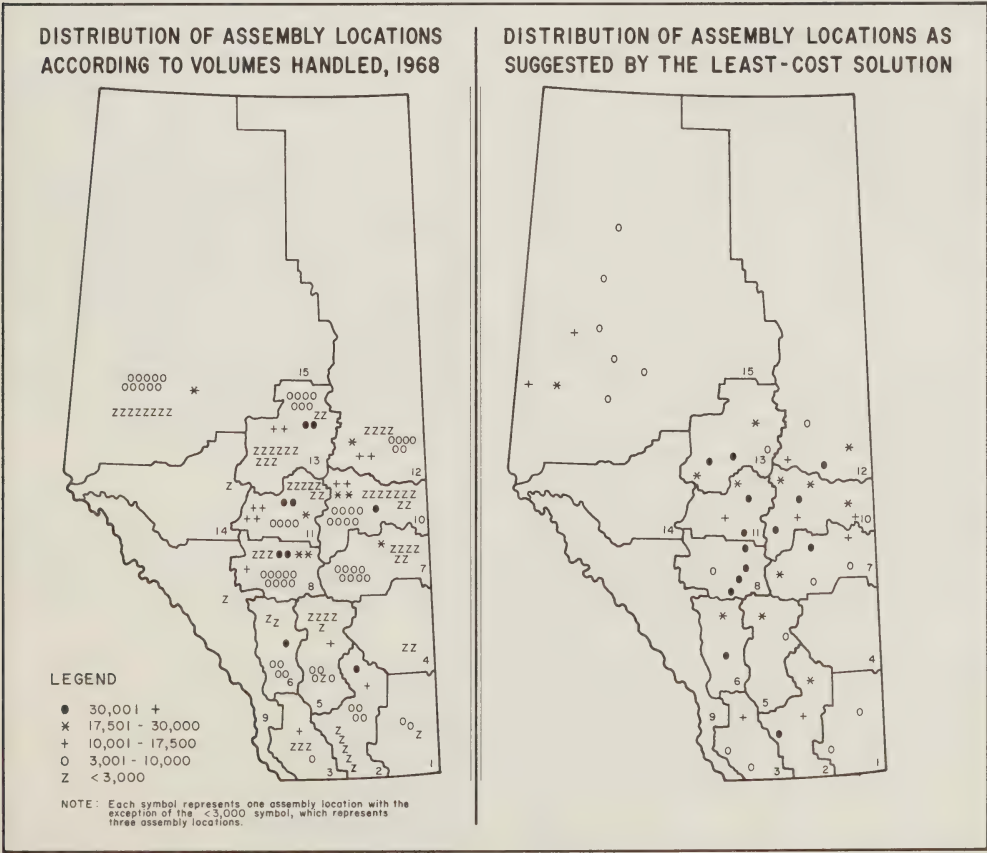
Cost savings were relatively small for the thirtieth to fifty-first assembly locations; however, utilization of these locations was justified on the basis of cost savings and added convenience to producers. Ad-

dition of locations beyond the least-cost solution (51 locations) was considered arbitrary; costs were increasing and assembly volumes were small. In other words, the extra cost per hog was more than offset by the convenience of additional assembly locations.

The least-cost solution distributed Alberta's hog marketings among 51 assembly locations rather than using over 300 locations (with approximately 500 assemblers) as does the present system (Figures 5 and 6). Average assembly and transportation costs per hog in 1970 were: assembly, 44 cents; transportation, 96 cents; for a total of \$1.40 per hog. Average costs established in the least-cost solution were: assembly, 19.9 cents; transportation, 79.4 cents; for a total of 99.3 cents per hog. The solution suggested a reduction in marketing costs of over 40 cents per hog. For all the hogs assembled, marketing costs were reduced by over half a million dollars as

a result of economies of size in assembly operations and through the elimination of duplication in assembly and trucking facilities. These savings did not include possible economies created in the transportation system as a result of more concentrated volumes. Moreover, with fewer assembly locations, the potential for regulating the flow of hogs to packing centers increases. With 51 assembly locations, the average distance of producers from assembly locations would be approximately 15 miles, and few would have to travel more than 30 miles. Such distances are not unreasonable.

If hog assembly volumes were allocated as suggested by the model, competitiveness in the trucking and assembly business would be more limited. Therefore, the distribution of any benefits from cost reductions would depend partly on how a consolidation plan was administered and partly on the distribution of market and bargaining power. All participants in-



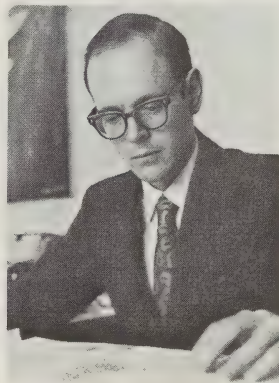
volved in the market channel could expect to share the cost savings and benefits created through increased operational efficiency. Any improvements in operational efficiency brought about by a consolidation plan could also be expected to complement exchange efficiency in the market channel.

REFERENCES

- Beckman, M., 1968. *Location Theory*. New York: Random House.
- Dawson, J.L., 1971. "A Location Analysis for Alberta Hog Assembly Centers." Unpublished M.Sc. thesis. Edmonton: the University of Alberta, Department of Agricultural Economics and Rural Sociology.
- Dawson, J. L., A. A. Warrack, and M. H. Hawkins, 1971. *Location Analysis for Alberta Hog Assembly Centers*. Agricultural Economics and Rural Sociology Technical Research Bulletin 11. Edmonton: The University of Alberta, Department of Extension.
- Stollsteimer, J. F., 1961. "The Effects of Technical Change and Output Expansion on the Optimum Number, Size, and Location of Pear Marketing Facilities in a California Pear Producing Region." Unpublished Ph.D. thesis. Berkeley: University of California.
- Warrack, A. A., 1967. "Location Analysis of the Iowa Feed Manufacturing Industry: Least-Cost Alternatives." Unpublished Ph.D. thesis. Ames, Iowa: Iowa State University.
- Warrack, A. A. and L. B. Fletcher, November 1970. "Plant-Location Model Suboptimization for Large Problems." *American Journal of Agricultural Economics*, 52:4, pp. 587-590.

COMMODITY NOTE — MUSTARD

**Canada, the world's leading mustard exporter,
will likely set a new record in the 1970-71
crop year.**



*Ron Miller**

OUTLOOK

Exports

Exports of mustard seed for the 1970-71 crop year by the end of March, were 128 million pounds—a third more than the 95 million pounds exported during the same period in 1969-70. In fact, exports so far this year are only four percent below the total export figure for all of 1969-70, 133 million pounds. As a result, total exports of Canadian mustard seed in 1970-71 may set a new record of 160 million pounds or even higher. The United States, Japan and the EEC continue to be the main markets for Canadian mustard seed.

Production

Contract prices for the 1971 mustard seed crop are much the same as last year. Prices for yellow mustard range from 3.5 to 4.25 cents a pound while those for the brown and oriental types range from 2.5 to 2.85 cents a pound.

Early unofficial estimates of the 1971 mustard seed crop in Western Canada place the total area seeded at about 250 thousand acres, 25 percent more than in 1970. Acreages will likely increase in all three

Prairie provinces. Demand for all the three mustard types is high and an increase in acreage is forecast for each. Manitoba, which withdrew completely from brown and oriental mustard production in 1970, is expected to have limited crops of both types this year.

SITUATION: 1970

Acreage

The 1970 acreage of mustard dropped for the second consecutive year to 200 thousand from 267 thousand in 1969 and the record 533 thousand in 1968. Acreage was down sharply in both Saskatchewan and Manitoba, but in Alberta it increased 10 percent. Saskatchewan remained the largest producer with 60 percent of the total acreage. The 1970 acreages for each type (1969 in brackets), were as follows: yellow, 112,600 acres (101,100) brown, 34,400 acres (121,400); and oriental, 53,000 acres (44,500).

Mustard acreage in Manitoba declined sharply in 1970 to 25 thousand acres from 37 thousand in 1969. Yellow mustard was the only type grown. This was a change from the previous year when over 20 percent of the acreage was planted to brown and oriental types.

Mustard acreage in Saskatchewan—120 thousand acres—was 60 thousand less than in 1969. The 1970

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TABLE 1—MUSTARD SEED ACREAGE, BY TYPE, CANADA AND PRAIRIE PROVINCES, 1969 AND 1970

Type	Canada		Manitoba		Saskatchewan		Alberta	
	1969	1970	1969	1970	1969	1970	1969	1970
—thousand acres—								
Yellow Mustard.....	101.1	112.6	28.8	25.0	55.8	61.2	16.5	26.4
Brown Mustard.....	121.4	34.4	5.6	...	100.8	30.0	15.0	4.4
Oriental Mustard.....	44.5	53.0	2.6	...	23.4	28.8	18.5	24.2
Total.....	267.0	200.0	37.0	25.0	180.0	120.0	50.0	55.0

Source: Field Crop Reporting Series—No. 20, Cat. 22-002, November 1970, Dominion Bureau of Statistics.

acreage in Alberta increased by five thousand acres over the previous year to 55 thousand. The main crop in both provinces was yellow mustard—61,200 acres in Saskatchewan and 26,400 acres in Alberta. Oriental mustard seed acreage in Saskatchewan and Alberta was 28,800 and 24,200 acres respectively, while the 1970 brown mustard crop occupied 30,000 acres in Saskatchewan and 4,400 acres in Alberta.

Production

The average yield per acre for mustard seed in Canada last year dropped to 940 pounds from the record 966 pounds per acre in 1969. Manitoba was the only province where the average yield increased. It rose to 840 pounds per acre from the 810 pounds per acre of 1969.

Mustard seed production in Canada last year declined by 27 percent from the 1969 level to 188 million pounds. This is sharply below the record production of 1969 when the crop produced a record 469 million pounds. Production of mustard in 1970 by province, (1969 in brackets) was as follows: Manitoba, 21 million pounds (30 million pounds); Saskatchewan, 118.2 million pounds (178 million pounds); and Alberta, 48.7 million pounds (50 million pounds).

EXPORTS: 1970

Exports of Canadian mustard seed in 1970 reached a record 154 million pounds. This is an increase of 15

percent from the 134 million pounds exported in 1969 and is 55 percent above the annual average exports during 1964-68. Total export value, \$7.7 million, was six percent below the level of 1969, but 27 percent above the five year average.

A major factor influencing the level of exports in 1970 was the liquidation of large stocks of lower quality yellow mustard, some of it stored on farms since the record crop in 1968. Much of it was grown without the benefit of contracts, largely in Saskatchewan. Returns to producers from the sale of this lower grade mustard ranged from 1½ to 2 cents a pound.

Mustard seed exports from Canada go to three major markets—the United States, the EEC, and Japan. In 1969 and again in 1970, these three markets, combined, took more than 99 percent of total Canadian exports.

Exports to the U.S. in 1970 increased by 43 percent to 90 million pounds from 63 million pounds in 1969, and were 52 percent above the annual average during 1964-68. This is Canada's largest market for mustard seed, representing in 1970, 58 percent of all exports. Last year, purchases of Canadian mustard seed by the EEC declined by 15 percent to 44.8 million pounds from 52.7 million pounds in 1969. Canadian exports to Japan showed a slight increase to 18.6 million pounds from 18.1 million pounds in 1969. The balance of exports in 1970, 957 thousand pounds, went mostly to four Central and South American countries—mainly Argentina.

CHANGING FARM CREDIT TRENDS AND CURRENT OUTLOOK

"In 1968, 1969 and 1970, the flow of credit into agriculture leveled off after increasing steadily since 1960."

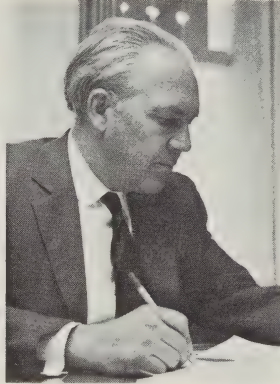
"(During the period 1968 to 1970), credit institutions generally became more selective, shortened the length of loans and required greater security".

"A further decrease in credit extended (is foreseen for 1970)".

"There has been a significant decline in long-term credit and an even more significant increase in short-term credit".

"Intermediate-term credit is, for some reason, (disappearing), few farm loans being made for terms of four to ten years."

"More credit will be extended to farmers in 1971 . . . a large proportion of it being associated with the consolidation of debt".



*R. S. Rust**

In 1968, 1969 and 1970, the flow of credit into agriculture leveled off after increasing steadily since 1960. Poor market prospects, especially for western grains, a tight money situation lasting well into 1970, and interest rates which were higher than the business of farming could afford to pay in relation to possible returns, were the major causes of the slow down in credit flow. The effect of these factors on the quantity of credit extended is extremely difficult to assess because numerous other factors, unfavorable to agriculture, were operative at the same time. During 1970, bankruptcies in the non-agricultural sectors have been higher than at any time in the previous ten years. The situation in farming was similar in many respects. Advertisements on farm foreclosure sales, reports on pending foreclosures and bankruptcies indicate that financial disaster hit many farms in 1969 and especially in 1970.

A modern farm business, like its counterparts in other sectors, relies heavily on the use of credit in its yearly operations. When credit is not available or is extremely expensive, the efficiency and growth of such farms begins to decline. A major difference between the cost of credit used by farm businesses and many businesses in other sectors is that the

former are generally unable to pass on increases in costs through increases in product prices. In many types of farm production, during the last three years, farm product prices decreased while interest costs increased. A decrease in the flow of credit and an increase in the cost of credit would therefore have a significant impact on farm businesses. The credit situation combined with a lack of markets for certain agricultural products should eventually reveal that during 1970 in particular, there was a significant decrease in farm expansion, a decrease in the rate of movement of people out of agriculture, and, with the additional factor of an increase in summer-fallow acreage in the Prairie provinces, a decrease in agricultural productivity.

Credit extended to Canadian farmers in 1960 totaled approximately \$1,030 million and by 1967 had reached \$2,270 million¹. The estimates for 1968 and 1969 are \$2,177 million and \$2,169 million, respectively. While data for 1970 (this includes up to March 31, 1971) are far from complete, they suggest that a further decrease in credit extended occurred. The estimated debt of Canadian farmers in 1960 was \$1,585 million and by the end of 1967 was nearly \$3,951 million. The estimated farm credit outstanding for 1968 and 1969, respectively, was \$4,105 million and \$4,425 million (Table 1). Indications are that farm debt in 1970 remained very close to the 1969 level.

*Dr. R. S. Rust has been a CDA economist since 1959. He is a member of the Farm Management and Agricultural Adjustment Division, Economics Branch. This article is the latest of his well-received series of articles and publications on farm credit. Since his first article in 1963, Dr Rust has earned the role of Canada's leading farm credit economist. This year, he departs from his usual practice by including some outlook information.

¹R. S. Rust, A Review of Farm Credit and Farm Income Relationships, Canadian Farm Economics, Volume 5, No. 2, June 1970, Economics Branch, Canada Department of Agriculture.

TABLE 1—ESTIMATED FARM CREDIT EXTENDED AND OUTSTANDING, CANADA, 1967 TO 1969

Source and term of credit	Estimated farm credit extended			Estimated average interest rate	Percent of credit extended by source 1969	Estimated farm credit outstanding			Estimated interest charges 1969	Estimated average interest rate	Percent of credit outstanding by source 1969
	1967	1968	1969			1967	1968	1969			
	million of dollars										
LONG-TERM (more than 10 years)											
Farm Credit Corporation	251.2	205.3	158.0	8.2	7.3	915.8	1,036.1	1,111.5	57.30	5.5	25.1
Veterans' Land Act.....	31.3	20.1	17.9	8.2	0.8	172.3	180.4	167.5	9.21	5.5	3.8
Provincial government agencies	63.6	60.4	42.8	4.0	2.0	332.3	351.7	372.1	14.39	3.9	8.4
Private individuals	16.0	15.0	17.0	8.0	0.8	65.0	67.0	70.0	3.78	5.4	1.6
Insurance, trust and loan companies	13.0	13.0	7.0	12.0	0.3	56.0	60.0	58.0	5.16	8.9	1.3
Treasury Branches (Alberta)	1.4	1.0	1.0	9.0	a	1.5	1.4	1.0	0.09	9.0	a
Alberta Electrical Co-operatives	2.0	2.0	2.0	3.5	0.1	17.2	16.8	16.1	0.50	3.5	0.4
Total long-term	378.5	316.8	245.7	7.5	11.3	1,560.1	1,713.4	1,796.2	90.43	5.0	40.6
INTERMEDIATE-TERM (18 months to 10 years)											
Banks (Farm Improvement Loans)	203.7	40.2	142.0	8.3	6.6	432.6	308.5	306.1	23.72	7.75	6.9
Banks (other than Farm Improvement Loans)			20.0	9.5	0.9			21.0	1.89	9.00	0.5
Private individuals	134.0	130.0	144.0	8.0	6.7	538.0	510.0	560.0	36.40	6.50	12.7
Supply companies	43.0	35.0	31.0	16.0	1.4	131.0	120.0	134.0	17.42	13.00	3.0
Farm Credit Corporation (loans to farm syndicates)	1.0	1.7	2.9	8.0	0.1	2.2	3.4	4.8	0.34	7.20	0.1
Insurance, trust and loan companies	4.0	5.0	7.0	12.0	0.3	19.0	20.0	18.0	1.71	9.50	0.4
Industrial Development Bank	6.1	8.4	9.5	10.0	0.5	22.0	23.0	26.0	2.34	9.00	0.6
Credit Unions	90.0	70.0	40.0	11.0	1.9	120.0	125.0	103.0	9.82	9.50	2.3
Municipalities (Ontario Tile Drainage Act)	2.6	4.3	5.1	4.0	0.2	10.2	12.9	16.1	0.64	4.00	0.4
Finance companies (cars and trucks)	16.0	15.0	11.0	18.0	0.5	23.0	21.0	18.0	2.97	16.50	0.4
Treasury Branches (Alberta)	2.7	2.3	3.0	9.0	0.1	2.8	3.9	3.9	0.34	8.7	0.1
Total intermediate-term	503.1	311.9	415.5	9.4	19.2	1,300.8	1,147.7	1,210.9	97.59	8.1	27.4
SHORT-TERM (up to 18 months)											
Banks (other than Farm Improvement Loans)	733.0	895.0	990.9	9.2	45.6	586.6	716.0	792.7	70.55	8.9	17.9
Supply companies	348.0	300.0	218.0	18.0	10.1	261.0	242.0	254.0	43.18	17.0	5.7
Credit Unions	150.0	187.0	116.0	12.0	5.3	120.0	150.0	220.9	24.30	11.0	5.0
Finance companies (household and personal)	15.0	12.0	13.0	20.0	0.6	12.0	10.0	12.0	2.28	19.0	0.3
Dealers, stores, etc.	15.0	14.0	12.0	12.0	0.6	5.0	5.0	6.0	0.60	10.0	0.1
Private individuals	110.0	105.0	115.0	8.5	5.3	88.0	90.0	95.0	7.60	8.0	2.2
Treasurer Branches (Alberta)	16.4	17.1	19.0	9.0	0.9	13.5	13.7	17.7	1.50	8.5	0.4
Sedco (Saskatchewan)	1.0	.6	4.8	9.8	0.2	1.5	1.7	2.4	0.21	8.7	a
Co-operative programs		17.8	19.0	9.8	0.9		12.3	12.0	1.18	9.0	0.3
Unpaid taxes							3.0	5.0	0.45	.9	0.1
Total short-term	1,388.4	1,548.5	1,507.7	10.8	69.5	1,089.8	1,243.7	1,417.7	151.85	10.7	32.0
Total all credit	2,270.0	2,177.2	2,168.9	10.1	100.0	3,950.7	4,104.8	4,424.8	339.87	7.7	100.0

^a Less than 0.1 percent.

In Western Canada, the decrease in the sale of grains disrupted many farm business plans. However, advances under the Prairie Grain Advance Payments Act allowed many farmers to continue their operations and undoubtedly reduced the demand for credit and prevented some bankruptcies. Cash advances under the Act as of July 31, 1969 and 1970 totaled \$151.9 million and \$272.8 million, respectively. The balance to be refunded by producers as of July 31, 1970 was \$141.9 million².

During periods when tight money conditions exist or when prospects in agriculture are such that loan risks increase, credit institutions generally become more selective, shorten the length of loans, and require greater security. The new approach of many banks in making loans to farmers is to have a closer look at the total farm business, the business ability and integrity of the applicant, and the farm's future prospects in relation to planned production. While the new approach is a step in the right direction, it must be recognized that it also fitted in nicely with the conditions that existed from 1968 to 1971. The amount of security taken on farm loans by non-government lending institutions in relation to the size of loans extended has been a matter of concern to farmers for many years. Although greater security is taken when risk increases, the extent of security taken on low risk loans (even in times of agricultural prosperity) requires further study and investigation. The shortening of the average length of loans, in times when money is scarce and a high risk is involved, might suggest that there has been little change in the flow of money in agriculture. What is

often forgotten is that if loans normally obtained for a three year term are extended on a shorter basis and if adverse conditions persist for a period longer than the duration of the loans, the problem of repayment is greater than what is indicated by the total flow of credit into agriculture. If, in addition, excessive security has been taken on such loans, the problem of financing the farm business becomes acute.

The approximate proportions of long, intermediate, and short-term credit extended and outstanding for the 1960 to 1969 period are shown by the data in Table 2. Although the breakdowns of data by length of term are at best only approximations, the changes since 1966 reflect a significant slow down in the percent of total credit extended that was of a long-term nature and an even more significant increase in short-term credit. Long-term credit as a percent of total credit decreased from 17 percent in 1966 to 11.3 percent in 1969, while short-term credit extended increased from 59.4 percent of the total in 1966 to 69.5 percent in 1969. Because of the unusually low number of FILA loans in 1968, the trend in intermediate-term loans extended is not clearly indicated by the data. In spite of the larger proportion of intermediate-term loans in 1969 over that of 1968, it is apparent that a significant decrease occurred in 1970. The relative decrease in long-term loans in recent years reflects mainly the slow down in land purchases for expansion purposes. The increase in short-term credit, taking into consideration a decrease in the purchase of many farm inputs, indicates attempts to keep farm businesses in operation using relatively expensive credit. As might be expected, the percent of the total debt that was long-term in the period 1960 to 1969 increased steadily until 1968, but took a very slight downturn

²Canadian Wheat Board, Annual Report 1969-70, 423 Main Street, Winnipeg, Manitoba, page 68.

TABLE 2—ESTIMATED PERCENT OF FARM CREDIT EXTENDED AND OUTSTANDING BY LENGTH OF TERM, 1960 TO 1969 INCLUSIVE

Year	Farm credit extended			Farm credit outstanding		
	Long term	Intermediate term	Short term	Long term	Intermediate term	Short term
	percent of total					
1960.....	11.9	21.3	66.8	30.0	36.6	33.4
1961.....	12.0	20.2	67.8	31.5	35.0	33.5
1962.....	11.6	20.2	68.2	32.3	34.0	33.7
1963.....	11.9	21.1	67.0	33.2	33.6	33.2
1964.....	13.7	21.6	64.7	34.5	33.8	31.7
1965.....	15.7	23.4	60.9	36.3	34.2	29.5
1966.....	17.0	23.6	59.4	38.5	34.0	27.5
1967.....	16.7	22.2	61.1	39.5	33.0	27.5
1968.....	14.5	14.4	71.1	41.7	28.0	30.3
1969.....	11.3	19.2	69.5	40.6	27.4	32.3

in 1969. As for intermediate-term debt, the proportion has been falling. Although one normally would expect it to increase over time if the average length of loan was for five years.

It indicates that not only fewer loans but also shorter-term loans were extended in this category. Undoubtedly, the actual average length of loan is shorter than three years. This implies that few intermediate-term farm loans are made for periods from four to ten years. There is little to suggest that the trend to shorter intermediate-term loans will be reversed in the foreseeable future.

The estimated average interest rate for all credit extended in 1969 was 10.1 percent and ranged from an average of 7.5 percent for long-term credit to an average of 10.8 percent on short-term credit. The average rate of 10.1 percent on all credit extended was 0.5 percent higher than in 1968. The average interest rate on credit outstanding for 1969 changed only slightly for long-term credit but increased both for intermediate and short-term credit. Estimated total interest charges on farm credit accounts of nearly \$340 million for 1969 were nearly \$47 million higher than in the previous year (Table 1).

The significance of credit in modern agriculture is more readily visualized when credit data are compared with national farm income data. From 1960 to 1969 (Table 3), there was a 20 percent decrease in the number of farmers³, a 41 percent increase in net

farm income, only a 22 percent increase in realized net farm income, nearly a 111 percent increase in credit used and over a 179 percent increase in farm debt. While net farm income in 1969 was nearly identical to that for 1964, farm debt was 69 percent higher.

When farm income data are related to farm credit data on a per census farm basis, a different set of relationships is obtained than that shown in Table 3. On a per farm basis, (Table 4) for the period 1960 to 1969 inclusive, there was an increase of more than 76 percent in net farm income, nearly a 53 percent increase in realized net farm income, a 164 percent increase in farm credit extended and an increase of 250 percent in farm debt. In spite of an inflationary period, farm receipts only increased by 87 percent. Farm expenses, however, increased by more than 110 percent.

While the data in Table 4 are based on averages per farm, a much different picture would be obtained if it were possible to present separate averages for commercial and non-commercial census farms. Such a breakdown would show very low incomes on non-commercial farms and relatively low farm debts. Averages for commercial farms, on the other hand, would indicate considerably higher net farm incomes, a wider gap between net and realized net farm incomes and relatively high farm debts.

³Estimate based on census data.

TABLE 3—ESTIMATED NUMBER OF FARMS, FARM RECEIPTS, FARM EXPENSES, NET FARM INCOME, REALIZED NET FARM INCOME, FARM CREDIT EXTENDED, FARM CREDIT OUTSTANDING AND AVERAGE ANNUAL CHANGES, CANADA, 1960 TO 1969

Year	Number of farms ^a	Farm receipts ^a	Farm expenses ^a	Net farm income ^a	Realized net farm income ^a	Farm credit extended ^b	Farm credit outstanding ^b
				millions of dollars			
1960.....	497,822	2,812	2,036	1,196	1,128	1,030	1,585
1961.....	479,125	2,294	2,072	922	1,195	1,150	1,785
1962.....	469,058	3,182	2,207	1,526	1,332	1,288	2,018
1963.....	458,991	3,215	2,362	1,521	1,219	1,461	2,298
1964.....	448,924	3,504	2,509	1,292	1,378	1,642	2,613
1965.....	438,857	3,819	2,712	1,567	1,519	1,863	3,004
1966.....	428,794	4,295	2,994	1,949	1,744	2,022	3,444
1967.....	418,727	4,383	3,212	1,496	1,651	2,270	3,951
1968.....	408,660	4,363	3,367	1,743	1,533	2,177	4,105
1969.....	398,593	4,206	3,429	1,688	1,380	2,169	4,425
				percent			
Period Change 1960 to 1969.....	-20.0	+49.6	+68.4	+41.1	+22.3	+110.6	+179.2

^a Excludes Newfoundland, Yukon and Northwest Territories.

^b Includes all of Canada.

Source: Canadian Farm Economics, Vol. 5, No. 2, June 1970.



TABLE 4—ESTIMATED NUMBER OF FARMS, AVERAGE FARM RECEIPTS, EXPENSES, NET INCOME, REALIZED NET INCOME, CREDIT, CREDIT USED AND DEBT, CANADA, 1960 TO 1969

Year	Number of farms ^a	Average farm receipts ^a	Average farm expenses ^a	Average net income ^a	Average realized farm income ^a	Average farm credit received ^b	Average farm debt ^b
	number			dollars per farm			
1960.....	497,822	5,649	4,090	2,402	2,266	2,061	3,172
1961.....	479,125	6,103	4,324	1,924	2,494	2,391	3,712
1962.....	469,058	6,784	4,705	3,253	2,840	2,736	4,286
1963.....	458,991	7,004	5,141	3,314	2,656	3,171	4,988
1964.....	448,924	7,805	5,589	2,878	3,070	3,643	5,798
1965.....	438,857	8,702	6,180	3,571	3,461	4,228	6,818
1966.....	428,794	10,016	6,982	4,545	4,067	4,697	8,000
1967.....	418,727	10,467	7,671	3,573	3,943	5,399	9,397
1968.....	408,660	10,676	8,239	4,265	3,751	5,305	10,003
1969.....	398,593	10,552	8,603	4,235 percent	3,462	5,442	11,102
Period change 1960 to 1969.....	-20.0	+86.8	+110.3	+76.3	+52.8	+164.0	+250.0

^a Excludes Newfoundland, Yukon and Northwest Territories.

^b Averages based on estimated total number of farms in Canada.



TABLE 5—THE RATIO OF FARM DEBT TO FARM INVESTMENT, CANADA, 1960 TO 1969

Year	Farm debt	Investment in farm real estate, machinery and livestock ^a	Debts as a percent of real estate machinery and livestock investment	Estimated total investment of farmers ^b	Debt as a percent of total investment
	millions of dollars		percent	millions of dollars	percent
1960.....	1,584.6	12,680.0	12.5	14,088.9	11.2
1961.....	1,785.1	13,159.2	13.6	14,621.3	12.2
1962.....	2,017.8	13,669.7	14.8	15,188.6	13.3
1963.....	2,297.6	14,508.5	15.8	16,120.6	14.2
1964.....	2,613.3	15,744.1	16.6	17,493.4	14.9
1965.....	3,004.4	17,217.8	17.4	19,130.9	15.7
1966.....	3,444.2	19,062.7	18.1	21,180.8	16.3
1967.....	3,950.7	20,952.6	18.8	23,280.6	17.0
1968.....	4,104.8	22,443.1	18.3	24,936.8	16.5
1969.....	4,424.8	23,318.9	19.0	25,909.9	17.1

^a Source: Quarterly Bulletin of Agricultural Statistics, Cat. No. 21-003, Dominion Bureau of Statistics.

^b Ninety percent of total investment is estimated to be in farm real estate, machinery, equipment and livestock, and ten percent in other investments.

Largely because of increases in farm real estate values during the 1960 to 1967 period, farm debt as a percent of farm investment did not increase as much as might have been expected. The data in Table 5 indicate that farm debt as a percent of investment in farm real estate, machinery and equipment, livestock and poultry only increased from 12.5 percent in 1960 to 19.0 percent in 1969. When an allowance of 10 percent was made for other investments on the farm or elsewhere, farm debt as a percent of the total investment of farmers increased from 11.2 percent in 1960 to 17.1 percent in 1969. However, it must be realized that while the 17 percent is probably representative of the ratio of debt to investment on an average census farm, a large number of commercial farms have a ratio of debt to investment that is double the average farm ratio.

CURRENT OUTLOOK

While present indications suggest that more credit will be extended to farmers in 1971 than in 1969 or 1970, a large proportion of this credit will be associated with the consolidation of debt. Whether financed by credit, from sacrificing income from sale of assets or from products sold, a major effort is expected to be made to pay off overdue interest and

principal payments on loans and to pay off short-term debts. If this can be accomplished in 1971, then an increase in the use of credit for production purposes and business expansion should develop in 1972, providing no further unfavorable situations develop. In spite of reductions in the prime interest rate of banks and interest rates generally, the rates charged to most farmers for intermediate and especially short-term credit are not expected to be greatly reduced from 1970 levels. Financial institutions appear to believe that the risk in agriculture is still relatively great compared to other industries. Therefore many applications for loans will not be accepted except where extensive security is given and relatively high interest rates are charged. Under the conditions that prevailed in 1970, it appears that many farmers could not obtain federal or provincial guaranteed loans from banks or other institutions and this resulted in a decrease in loans of this type. While some improvement may occur in 1971, a major upswing is not expected. The experience of the last few years in the farm credit field makes it highly probable that the activity of life insurance, trust, and loan companies in making farm loans will be for the most part phased out and shifted into more promising sectors of the economy.

COMMENT

Mr. Don Kidd,
Mktg. & Trade, C.D.A.
Fredericton, N.B.

Dear Mr. Kidd,

I was pleased today to read your article "Contract Selling of Potatoes" (June, 1971, C.F.E.). Having been personally involved in selling to potato processors in Maine, N.B., Quebec, and P.E.I., I have some comments that might be worthwhile.

My main point is that the processors' contracts, as we know them in the Maritimes, are entirely too one-sided. That is they protect the processors at every turn but give little protection to growers. For instance when the grower signs, he agrees to "follow specifically and accept the instructions and advice of the Company with regard to" such things as fertilizer application, planting time, harvesting time, etc. In most cases this is an unrealistic covenant as the grower (especially in N.B.) is usually more efficient than the processor as far as the actual *growing* of the spuds goes. The Company may have the technical know-how about growing but my experience shows that the average N.B. grower can produce processing potatoes more economically than the processor can.

Perhaps a better example of a one-sided contractual covenant is the clause that says that "at the *sole* discretion of the Company, (if) the said potatoes supplied by the Grower are not suitable to the satisfaction of the Company", then the Grower is responsible for replacing them. This is probably OK (except I would challenge the word "sole") but, in the interest of equality, the Grower should have something in the contract to protect *himself* if it becomes evident that the Company is being managed in such a way as to endanger the Grower's financial position. This was evident to some growers here on P.E.I. this Fall in the Seabrook's affair but the contract offered the growers no protection against inefficient processor management practices (and many of these only became evident after contracts were signed during the summer).

Still another clause found in most processors' contracts, that seems repugnant because there is not a similar clause protecting growers is the one that protects the Company in the event of non-purchase of potatoes due to conditions caused by an Act of God. Wouldn't it be only good public relations to protect growers in the event of non-delivery resulting from an Act of God? The fact that processors do not have such a clause in their contracts leads the careful reader to develop creeping thoughts that the clause may be an "out" for processors and they don't want such an "out" for growers. And these creeping thoughts may be unfair but they won't go away! It is an inequitable circumstance as it stands.

I hope you won't think me an outright nit-picker but you seem to have accepted the freezers' idea that (Page 14) they like to have only a few, large producers supplying them, but don't want to become dependent on too few producers either. It would be good to recognize that the situation is often viewed in the same manner by Growers of processing spuds in that they don't like to be dependend on only one processor either. My only other comment on the Grower-Processor relationship at this time is that it is unduly difficult for Growers to bargain on price because they *can't get* all the information that they need to become effective in this area (of bargaining). This is true even if the grower happens to be a subscriber to Fraser's Potato Newsletter because we *can't get* the information either. The information referred to here is the *stocks of frozen french fries* on hand at the beginning of each month in Canada. D.B.S. officials say that they can't force the processors to give up the figures and that legislation relative to the matter is ineffective. Can you or your office suggest to the potato-growing public any avenues to explore that might be helpful to us in getting the figures?

Yours, not critically, but constructively

Harry Fraser,
Fraser's Potato Newsletter.

POLICY AND PROGRAM DEVELOPMENTS

Agricultural Products Board Act (Egg Purchase Program)

The Agricultural Products Board has been authorized to purchase up to 50,000 cases of shell eggs by tender, and, to store, transport, process and package those eggs or any processed products. The Federal Government has also authorized the Board to incur a loss relating to the above purchase and sale operations not exceeding \$200,000. (June 8, 1971)

The egg products are expected to make up part of Canada's contribution to the World Food Program. The Board will buy eggs by means of weekly tenders and the purchased eggs will be processed into products such as melange and powder.

Increased egg supplies and disruptive marketing practices, have resulted in very low prices to producers so far this year.

The Federal Minister of Agriculture said that whether the program continues beyond six to eight weeks is dependent on the industry and all provincial governments and agencies moving to bring production more in line with available markets.

Agricultural Stabilization Act (Sugar Beet Support Program)

In early June, the Minister of Agriculture announced the Federal Government's price stabilization program for the 1971 sugar beet crop.

The price will be supported through deficiency payments at the same level as last year—\$15.98 per standard ton of beets delivered to the processing plant. A standard ton yields 250 pounds of refined sugar.

About 2500 farmers in Alberta, Manitoba and Quebec are producing sugar beets under contracts with refineries.

Following a reduction in acreage of nearly 13 percent in 1970, sugar beet production dropped to 910,000 tons from 1,078,000 tons in 1969. Manitoba was hardest hit by this reduction, but production is expected to increase this year.

Provinces	1969	1970	Change in Production
Alberta	576,500	523,500	53,000
Manitoba	343,142	216,142	127,000
Quebec	158,441	170,000	11,559

The only rise in production was in Quebec, but acreage remained the same as the year before.

Agricultural Stabilization Act (Manufacturing Milk and Cream Stabilization Order)

Manufacturing milk and cream were, following this order, designated as agricultural commodities for the purposes of the Agricultural Stabilization act.

Thereby, the prescribed price for manufacturing milk was 164.7 percent of the base price. To stabilize the price of manufacturing milk at the prescribed price, the Agricultural Stabilization Board may now make payments totalling \$109 million to the Canadian Dairy Commission for the period April 1, 1971 to March 31, 1972. (June 8, 1971)

Changes in the Dairy Subsidy Holdback

The Canadian Dairy Commission has reduced its rates of holdback from producers' payments for industrial milk and cream. The new rates are effective on and after June 1, 1971.

In provinces under market sharing quotas, (Quebec and Ontario) the holdback is made from the market payment and producers holding subsidy quotas receive the full rate of subsidy.

In provinces not under market sharing quotas, the holdback is made from subsidy payments.

On deliveries of industrial milk within market quotas or within subsidy quotas, the rate of holdback was reduced from 26 cents per hundred pounds of 3.5 percent milk to 20 cents (or 5.71 cents per pound of butterfat).

The holdback on milk deliveries in excess of market sharing quota was reduced from \$2.50 to \$2.05 per hundred pounds. The holdback on subsidy payments on milk deliveries in excess of subsidy quota, was reduced from \$1.25 to \$1.05 per hundred pounds.

There is no holdback on cream deliveries within subsidy or market sharing quotas.

The holdback from subsidy payments on cream deliveries in excess of subsidy quota was reduced from 8 cents per pound of butterfat to 5 cents. The holdback on cream deliveries in excess of market sharing quota will be 30 cents instead of 50.58 cents per pound of butterfat.

The CDC explained that the present reductions in holdbacks have been made possible as a result of an improvement in world market prices for dairy products. Should the revenue from the holdbacks exceed the cost of disposing of surpluses produced in the 1971-72 year by any significant amount, the Commission will make a refund to producers after the end of the year.

Grassland Incentive Program

The Grassland Incentive Payment Regulations issued in May authorized the Minister of Agriculture to make a payment of \$5.00 per acre for land seeded this year to grass, and which was last year, in summerfallow or in a crop other than grass. The eligible grassland acreage must also represent an increase in the number of acres in grassland over the 1970 acreage (or base year acreage). A minimum increase of 25 acres in grassland was also set as a basis for application.

Payments made to an applicant during the year of application may be repeated the next year for each acre of grassland operated by him that continues to be in grass on July 15 of that year.

(May 11, 1971)

New Canadian Grains Institute

The Federal Government announced the establishment in Winnipeg of an internationally oriented Canadian Grains Institute. The Institute will offer practical courses in every aspect of the grain industry to foreign and Canadian participants.

"The prime reason for the establishment of the Institute" said Hon. Otto Lang and Hon. H. A. Olson, "is the promotion of Canadian grains and oilseeds in our overseas and domestic markets. It is vitally important that we maintain and use constructively the international fund of goodwill which has been developed through the years toward the Canadian grain industry."

Grain industry personnel will be offered comprehensive courses on production, handling, transportation and marketing, emphasizing the management, economics and technology of grains and oilseeds. Foreign participants in the school will represent countries that now import Canadian grains and oilseeds or may soon become customers.

The cost of the Canadian Grains Institute will be covered by a special fund set up by the Federal Government to support market development projects for grains and oilseeds.

WHAT IS HAPPENING ABROAD IN POLICY AND PROGRAM DEVELOPMENTS

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Canadian Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

World Grain Exports, 1970-71

As a result of the good demand for both bread and feedgrains through much of 1970, there was a substantial recovery in the aggregate volume of trade in grains. With fuller details of trade in 1970 now available, it is estimated that the combined exports of the main grains of the chief exporting countries were about 20 percent greater than in 1969. Trade was very buoyant in the early months of 1970-71 marketing year, and though it eased somewhat towards the end of 1970 and in the early months of 1971, the aggregate volume recorded so far for 1970-71 is still estimated at about 15 percent greater than a year before. (Grain Bulletin, Commonwealth Secretariat, London, March 1971)

Resumption of Australia's Meat Exports to Canada

The Australian Minister for Primary Industry

announced on April 19 that agreement had been reached with Canadian authorities for the resumption of Australian mutton shipments to Canada, with effect from that date.

The Canadian Government placed a ban on the entry of Australian mutton in June 1970, following a similar prohibition by the U.S.A. The U.S. prohibition had, however, been progressively lifted as individual works achieved satisfactory hygiene requirements.

The resumption of mutton shipments to Canada is subject to conditions that are necessary for the mutton to comply with U.S. import requirements, because of Canada's meat trading interests with the U.S.A. There are also special technical inspection requirements. (The Meat Producer and Exporter, Australian Meat Board, April 1971)

Drop Likely in Mexican Strawberry Output

Mexican strawberry production in the States of Guanajuato and Michoacan is expected to drop sharply from last season. The expected frozen pack will be about 80 million pounds, compared with last season's 137 million pounds.

The 1970-71 planted area was increased from 6,500 hectares (about 16,000 acres) to 7,100 hectares (about 17,500 acres). However, yields have been reduced by severe freezes in Guanajuato and by diseases and insects in Michoacan. The Guanajuato freezes in November and February have cut yields by 37 percent from last year. Michoacan's yields are down 15 percent.

No significant changes in marketing patterns are expected, although there has been some experimentation with air-shipped exports to Europe. About 60 percent of the Mexican crop is processed, 30 percent is exported fresh, and 10 percent goes to domestic consumption. (Foreign Agriculture, USDA, 5 April 1971)

EEC Support Purchases of Pork

On April 26, the EEC started purchases of pork to strengthen the market. Purchases were to be handled by national agencies but the program is now on an EEC-wide basis to ensure similar market prices in all countries in the Community. Under Regulation 121 of July 1967, support was optional if market prices dropped to the base price, set annually by the Council; the current price is \$77.25 per 100 kilos for carcasses. The provisions were amended in mid-April so that support operations could take place when the average of prices in representative markets fell to less than 103 percent of the base price, as determined by the Commission. This has now occurred.

This situation is the outcome of a cyclical peak in pork production. Output rose by a little over 5 percent to almost 5 million tons in 1970, but consumption increased more slowly. The EEC is just about self-sufficient in pork, hence any excess offers tend to depress the market. (First Secretary, Agriculture, Canadian Mission to the European Communities, Brussels)

Potato Crisps for Bonnier Pigs

Dehydrated flaked potatoes could become a popular feed for pigs if experiments by Britain's Potato Marketing Board prove successful. It has taken over

a processing factory at Dundee in Scotland, previously used for the manufacture of instant mashed potatoes for humans.

The Board's Development Officer, Mr. John Markham, believes the potato flakes should be highly digestible and easily mixed and suitable for either wet or dry feeding.

One of Britain's leading animal nutrition experts, Professor Ian Lucas of Bangor University, Wales, is also enthusiastic. He believes the flaked potatoes should prove quite suitable as a finishing ration for pigs. The protein content would be slightly less than that of barley but the flakes should be more digestible, he says. He believes the flakes should also have an advantage over conventional stock feed potatoes, as they would be much more convenient to use by the farmer. There would be no boiling equipment required, for instance, as is essential for stock feed potatoes. (British Farming, London, 28 May 1971)

Wasted Grain: A Matter of Disagreement

"Highly exaggerated statements are sometimes made regarding grain storage losses in India. Even at the Second World Food Congress at The Hague last year, a delegate twice declared that storage losses in India and Pakistan were as high as 50 percent. Such fantastic statements are not based on scientific data or on careful appraisal of the situation, and show a complete ignorance of the facts.

During the last 25 years there have been remarkable improvements in the techniques and practices of scientific storage of foodgrains in a variety of ways. Unfortunately these have not been widely implemented in India. Furthermore, being a tropical country, we have the greater disadvantage of the full play of high temperatures and heavy moisture, two major factors responsible for a heavy incidence of fungi, insects, weevils, etc. Our godowns (warehouses) though conforming to the standards prevalent at the time they were constructed, are today not always rodent or moisture proof and therefore admit of some avoidable losses. The trading community is estimated to have about 22 million tons storage capacity of this type.

Fortunately, it is not very difficult to make necessary adjustments in our existing godowns in the primary markets and in the consuming centers in order to bring them in line with the requirements of modern scientific warehouses. The Indian Standards Institution has, after a thorough study of the subject, laid down some standards of scientific warehouses of

foodgrains suitable under local conditions. With comparatively smaller investment and structural changes, the walls, roofs, floors and doors can be substantially improved so that the godowns are more or less free from infiltration of rodents and moisture. Simultaneously with these adaptations, fumigation and other modern practices, which prevent infestation by insects, could be further popularized. The requisite experience and inputs are now available indigenously.

India's total losses of foodgrains during storage are not as high as are often made out in some quarters. They are around six to seven percent, as estimated by a team of FAO experts. It must be remembered that with our food production valued at 13,300 million dollars per annum, we can save 130 million dollars for every one percent reduction in our food losses. It is, therefore, necessary for us to make all possible

efforts at all levels to avoid as much of these losses as we can.

A comprehensive program of constructing warehouses at all levels is urgently called for but there is need for extra special attention being paid to storage in the farmers' godowns. Farmers must be made aware of the advantages of scientific storage.

With greater production of foodgrains, the government is committed to a policy of relaxation of controls and both farmers and traders will have to carry much higher stocks. They should be provided with equal facilities along with the governmental agencies, who may be expected to hold buffer stocks." (Shri V.S. Aggarwal, President of the Federation of all India Foodgrains Dealers' Association, Delhi, in *Ceres*, FAO Review, March-April 1971)

PUBLICATIONS

Economics Branch Publications

Canada's Trade in Agricultural Products: 1969 and 1970. D. L. Bolton, Economics Branch, Canada Department of Agriculture. Ottawa, 1971. Pub. No. 71/9

Fresh Fruit and Vegetables: What's Available, and When. Economics Branch, Canada Department of Agriculture, Ottawa, 1971. Pub. No. 71/8

Canada Department of Agriculture Publications
Available from Information Division, CDA, Ottawa, Canada. K1A 0C5

Economics of Beef Production. I.F. Furniss and V. W. Yorgnson. Economics Branch, Canada Department of Agriculture. Ottawa, revised 1971. 33p., Illus., tables, fig., paper cover. Pub. No. 1356. Free.

Origin of Livestock Marketed. Monthly Report, Vol. 41, No. 4, April 1971. Free Cat. No. A 77-11/41-4.

Spoilage of Farm-stored Grain by Molds, Insects and Mites in Western Canada. R. N. Sinha. Prepared at the Research Station, Winnipeg, Manitoba. Ottawa, 1971. 8p. Illust., fig., Pub. No. 1437. Free.

The Dairy Goat in Canada. Ottawa, 1971. 21p., Illus., tables. Paper Cover. Pub. No. 1441. Free. This publication replaces Pub. No. 1023. "The Dairy Goat" issued in 1957.

Other Publications

Report of the Royal Commission on Farm Machinery. C. L. Barber. Ottawa, 1971. 636p., P.C. 1966-978 of May 26, 1966. Tables, fig., Cat. No. Z 1-196614. Price \$7.50 per copy. Contents: Introduction and Perspective, Market Structure and Competitive Behaviour, Competitive Position of the Industry in the North American and World Market, Mechanization of Agriculture, Special Problems and Issues.

Revenues, Costs and Profits in the Farm Machinery Industry. Study No. 11 from the Royal Commission on Farm Machinery. Donald Martinusen and Bernard P. Barry. Ottawa, 1970. 219p. tables, fig., Cat. No. Z-1-1966/4-11. Price \$2.50 per copy. Contents: North American Industry, Profits of the Major Firms, Sources and Uses of Funds of the Major Firms, Canadian Firms, Profits of the Canadian Firms, Finance Subsidiaries of the Major Firms.

Oligopoly in the Farm Machinery Industry. Study No. 12 from the Royal Commission on Farm Machinery. David Schwartzman. Ottawa, 1970. 249p., tables, fig., Cat. No. Z-1-1966/4-12. Price \$3. per copy. Contents: Industry Entry and the Char-

acteristics of Demand, Economies of Scale, Market Concentrations, Competitive Behaviour, Profits and Investments, Cost of Distribution.

Pesticides and Wildlife (Pest Guide). Published by the Department of Indian Affairs and Northern Development and the Canadian Wildlife Service. Ottawa, 1971. 2pp. Illus., Cat. No. R66-4071. Free.

You Can Fight Pollution. Department of National Health and Welfare. Ottawa, 1971. Folder. Illus., Bilingual, Cat. No. H-21-5671. Free. This pamphlet lists a number of ways you, as an individual, can help fight pollution.

The following publications are available from the Publications Distribution Unit of the Dominion Bureau of Statistics, Ottawa 3.

Estimates of Production and Disappearance of Meats. 1970 D.B.S. Ottawa, 1971. 4p. tables. Bilingual. Cat. No. 32-220/1970. Price 25 cents per copy.

Telegraphic Crop Report, Canada. D.B.S. Field Crop Reporting Series, 1971. Ottawa, 1971. Cat. No. 22-002. Price 20 cents per copy, \$4.00 for series of 20 reports.

Stock of Food Commodities in Cold Storage and Other Warehouses. D.B.S. Prepared in the Livestock and Animal Products Section, Agriculture Division, Ottawa, 1971. 11p. tables, Cat. No. 32-217/1970. Price 50 cents per copy.

FAO, OECD and EEC Publications.
Available from Information Canada.

The Reform of Agriculture in the European Community. Information Memo P. 21/70. Commission of the European Communities. Brussels, 1970. 6p. Free. Description of the Commission's draft directives from the reform of agriculture (Mansholt Plan). The directives deal with modernization of farms, withdrawal from farming activities, vocational training, establishment of producers' groups and reduction of the area devoted to agriculture.

Crop Loss Assessment Methods. FAO manual on the evaluation and prevention of losses by pests, diseases and weeds. FAO, Rome, 1970. Illus. Charts. Cat. No. AGP:CP/22

Principles of Food Packaging. Edited by Prof. R. Heiss. Published by arrangement with the FAO and P. Keppler Verlag. Munich, 1970. 332p. The techniques of packaging are not only indispensable in the distribution of agricultural products to the consumer but—properly designed—can prevent spoilage of many food commodities between harvesting and consumption. This guide does not claim to cover all aspects of the problem but is primarily a practical handbook.

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HON. H. A. OLSON, MINISTER — S. B. WILLIAMS, DEPUTY MINISTER

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CANADIAN FARM ECONOMICS

QUOTA POLICY IN THE WESTERN GRAIN INDUSTRY: HISTORICAL PERSPECTIVES

"Sustained economic growth in the prairie region . . . the attainment of a high level of performance in export markets . . . will be dependent upon the ability of the industry and governments to adapt to competition . . . Adaptation . . . is complicated by many issues . . . one of these issues is quota policy.

In strict economic terms the application of quota policy has involved the partial substitution of a quota system for the price mechanism . . .

. . . a deliberate policy of "supply management" is now being followed with the objective of matching aggregate supply with aggregate demand in the same crop year."



*George G. Pearson**

Problems and policies in the prairie grain industry have become, in the past two years, the focus of intensive reappraisal. At least two central themes have emerged from this period of introspection—1. Sustained economic growth in the prairie region is still heavily dependent upon the ability of the prairie grain industry (input suppliers, producers and marketing institutions) to generate income from the production and export of large volumes of grain; and 2. The attainment of a high level of performance in export markets is dependent upon the ability of the industry and governments to adapt to the

challenges of a more highly competitive world market place. Adaptation is not a simple matter; it is complicated by many issues. The present article provides a brief historical sketch of one of these issues—quota policy.

In strict economic terms, the application of quota policy has involved the partial substitution of a quota system for the price mechanism as a means of allocating aggregate derived demand among prairie grain producers. For many years the quota system was simply viewed as a means of distributing delivery opportunities and elevator space among producers—it was not intended to influence patterns or levels of grain production [CDA, *CFE*, 4:3, 1969, p. 22]. Accordingly it operated as an implicit vehicle of "orderly marketing".¹ However, as time passed and the capacity of producers to generate surpluses became a persistent feature of the industry, the quota system took on the added dimension of

*Mr. George G. Pearson is an economist with the Marketing and Trade Division, Economics Branch and is working on grains policy and programs. This article is based on one chapter of Mr. Pearson's masters thesis completed this past spring while on educational leave at the University of Alberta. For more information about the thesis subject, "Analysis of Quota Policy Problems, Objectives, and Alternatives in the Western Grain Industry" readers may contact the author directly in care of the Economics Branch, Canada Department of Agriculture, Ottawa, K1A 0C5. The author wishes to gratefully acknowledge the advice and assistance of his thesis supervisor, Dr. A. A. Warrack of the Department of Agricultural Economics, University of Alberta.

¹"Orderly marketing" is defined here as the process of matching the seasonal flow of grain with demand specifications in four dimensions—quantity, quality, position and timing.

A SUMMARY HISTORY OF THE CWB DELIVERY QUOTA SYSTEM AND TOTAL GRAIN INVENTORY

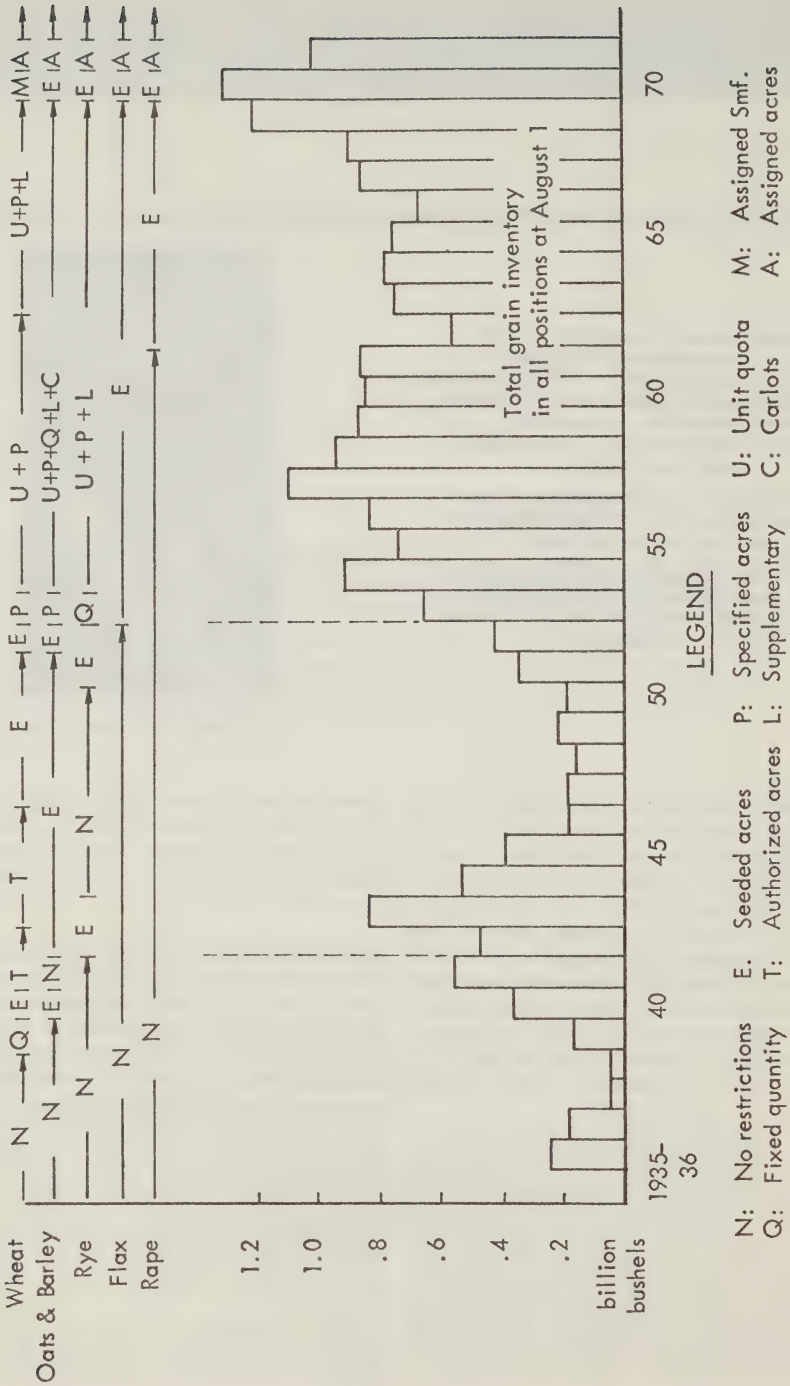


FIGURE 1

“supply control”.² The impact of the supply control feature on production does not appear to have been fully realized until the past two years. Specifically, empirical analysis suggests that restrictive quota levels along with prices and grain inventories contributed to a lagged production response among producers—changes in production typically lagged behind changes in demand. With the realization of the implications of quota policy for aggregate supply levels a deliberate policy of “supply management”³ is now being followed with the objective of matching aggregate supply with aggregate demand in the same crop year.

Although the objectives and mechanisms of the quota system have changed at least in that they have become more sophisticated, the principle of tying deliveries to land has not changed. The origin, evolution and current status of quota policy is reviewed in the present article with a primary emphasis on discovering the reasons underlying change. Figure 1 presents a summary history of quota policy compared with the historical development of the level of the total grain inventory. The figure reveals a significant feature underlying changes in policy, namely that activity leading to change has occurred when grain inventories had risen to high levels and quota restrictions on farmer deliveries were severe.

ORIGIN

The 5,000 bushel limitation. The first semblance of a delivery quota system was introduced by the Canadian Wheat Board on August 1, 1939, with the limitation of Board purchases of wheat to 5,000 bushels from any one producer in any one crop year. The reasons for this action were the expectation of high Board carry-over at the end of the 1938-39 crop year, the prospect of continued world surplus in 1939-40, the limited amount of suitable commercial storage space, and the desire of the federal government to limit its financial liability on the Board's guaranteed offering price. The 5,000 bushel limitation was dropped at the end of the 1939-40

crop year because of insurmountable administrative difficulties [CWBAR, 1939-40, p. 1].

The commencement of delivery regulations. The 1940-41 Wheat Program gave the CWB power to regulate deliveries by producers at country, mill, and terminal elevators and loading platforms. The primary reason for this action lay in the necessity for equally distributing limited elevator storage space and handling-transportation facilities among all producers in view of a large potentially deliverable surplus. Delivery quotas applied to all commercial deliveries of wheat, oats, and barley. Farmers readily cooperated, and the system operated satisfactorily in promoting orderly marketing [CWBAR, 1940-41, p. 1].

An experiment in supply control. The 1941-42 and 1942-43 crop years saw special attention focused on the problems of unprecedented surplus, storage, and financing. With financial resources urgently required for the war effort, Cabinet agreed that wheat deliveries must be restricted to the amount of wheat that could be sold at home and abroad during the 1941-42 crop year [CWBAR, 1941-42, p. 1].

The 1941-42 Wheat Program limited aggregate prairie wheat deliveries to 223 million bushels. Deliveries under the quota system were based on authorized acreage, defined as 65 percent of a producer's declared wheat acreage in 1940. No quota restrictions were placed on other grains. G. McIvor, Chief Commissioner of the CWB, noted before the House of Commons Agriculture Committee:

... according to the policy established for 1941-42, the producer was in the position of not only having to have his deliveries regulated during the crop year [orderly marketing] as in 1940-41, but also having a limit on the total amount of wheat which he could deliver [supply control] [H of C, SCAC, 1942, p. 159].

However, in 1941-42, the wheat quota was declared ‘open’ before the end of the crop year, and the question of supply control became irrelevant.

The 1942-43 Wheat Program limited aggregate prairie wheat deliveries to 280 million bushels. Wheat quotas continued to be based on the previous year's authorized acreage, with oats, barley, and rye based on seeded acreage and with no restrictions on flax and rapeseed. With the four major grains in abundant supply, the crop year ended with delivery quotas at a less than ‘open’ level and with 350 million

²“Supply control” is defined here as the practice of limiting aggregate supply of a particular grain for the purpose of raising average seasonal price above an equilibrium level—a price level which would prevail in the absence of constraints.

³“Supply management” is defined here as centralized control over quantity and/or price of one or more grains of specialized quality from a specified group of producers to a particular market or markets in a given period. Supply management is the sum of the effects of orderly marketing and supply control—the minimization of seasonal price fluctuations and the raising of average seasonal prices.

bushels in farm storage—four times the amount for any previous year. Supply control via the quota system became fact in 1942-43.

Alternative quota plans never implemented. One alternative endeavoured to incorporate some measure of yield productivity into delivery opportunity. G. McIvor explained to the Agriculture Committee:

... the Board did not wish to have the high yielding areas carrying the wheat which would have had to be carried on farms if we had had a large crop in 1941. The Board felt that after a certain yield per acre was harvested, say seven bushels per acre upward, the farm holdback should be shared by all producers ...

Under this plan the per bushel delivery quota of a producer would be based upon his authorized acreage and the average yield at his delivery point with a sufficient adjustment to prevent total deliveries exceeding 223 million bushels for the West [H of C, SCAC, 1942, p. 161].

This alternative was considered infeasible and according to McIvor was rejected for the following reason:

Frankly, we now feel that the variation in individual yields per acre at local points is too wide to permit this basis being used except in a year when production is extremely uniform through the West [H of C, SCAC, 1942, p. 161].

Another alternative embodied the concept of deliveries based on some unit other than acreage—a fixed number of bushels per farm or per quarter section, or a fixed number on the first quarter section and a reduced amount on succeeding quarters. The CWB rejected this alternative because it might encourage expanded wheat production or splitting up of farms into quarter section units and complicate transferring the quota upon sale of a farm.

EVOLUTION

Monopoly wheat marketing and open quotas. On September 27, 1943, the CWB became the sole marketing agency for the interprovincial and export sale of all wheat and the intraprovincial sale of wheat for human consumption. Sale of wheat for feed within provinces remained outside the Board's jurisdiction. The Board continued to be a voluntary marketing agency for oats and barley.

Wheat deliveries continued to be based on authorized acreage as defined in 1940 until 1947 when the basis was changed to seeded acreage. Oats and barley were based on seeded acreage; rye on seeded acreage in 1943-44, unrestricted until 1951 then on seeded acreage again; and flax and rapeseed were unrestricted. An aggregate limitation on wheat deliveries was established each year until 1947 when the practice was discontinued in light of recurring buoyant demand. Quota levels reached 'open' status every year between 1943-44 and 1951-52. Thus quota policy operated as a tool of orderly marketing, and supply control was not an issue. Throughout this period when delivery quotas were in effect, an overriding consideration was to secure delivery of as much milling quality wheat as possible to meet domestic and export commitments [CWBAR, 1950-51, p. 6].

The advent of supply control. The crop years 1952-53 and 1953-54 marked a period of painful transition as the buoyant prairie grain industry passed into an era of mounting surpluses. For the first time in the postwar period, the Board was unable to accept all of the wheat, oats, and barley that producers wished to deliver. When the 1952-53 crop year ended, about 220 million bushels remained on prairie farms.

It became increasingly apparent that the existing quota mechanism was inadequate for coping with problems of overproduction. If quotas had continued to be based on seeded acreage, it would have been virtually impossible for producers to deliver their 1952-53 carry-over in the 1953-54 crop year without again seeding acreage to a crop already in oversupply. The Board accordingly introduced a new concept called 'specified acreage' defined as the total seeded acreage of wheat (except durum), oats, barley, rye, and summerfallow. A general quota was established allowing a certain number of bushels per specified acre on which a producer could deliver either wheat, oats, barley, or rye in any combination. A minimum number of bushels was deliverable at each quota level thus granting small producers a delivery opportunity greater than proportional to their specified acreage.

De facto supply management. Throughout the sixteen year period between 1954-55 and 1969-70, quota policy consisted of a set of specific instruments for achieving an orderly, equitable (equal) flow of grain into commercial channels. Specific policy instruments included the unit, general, advance, supplementary, and special quotas. The unit quota—100 units equal to three bushels of wheat, five of barley or rye, or eight of oats or any combination



thereof¹—was designed to equalize returns per unit regardless of the type of grain delivered. The general quota consisted of an incremental number of bushels per specified acre with cultivated perennial forage crops included. Advance quotas provided for delivery of grain in urgent demand or for terminal drying. Supplementary quotas permitted delivery on seeded acreage or in fixed quantities, of particular types and grades of grain over the general quota. Special quotas, also delivered over quota, allowed shipment of accepted carlots of malting and pearling barley, manufacturing oats, outstanding stocks owned by estates, and limited quantities for the purchase of registered seed. Flax and rapeseed were based on seeded acreage.

Quotas were declared 'open' in only two of the eighteen years between 1952-53 and 1969-70, meaning that aggregate delivery restriction or supply control, with its indirect lagged impact on production, was an important feature during this period. While supply control was never an officially declared objective of quota policy it appears to have been a residual effect in practice. Likewise, orderly marketing—the matching of grain flow within the crop year with demand specifications—was never officially declared as an objective although it appears to have been operating in practice. The achievement of orderly marketing was often frustrated, however, by the practice of equalizing quota levels across the prairies. As a consequence marketing channels frequently

became congested with unmarketable stocks hindering the effective servicing of customers' needs. In general, it is apparent that the objectives of quota policy were never sufficiently well defined to permit the consistent and effective operation of the quota system.

THE CURRENT SITUATION

The early months of 1970 marked the beginning of a period of accelerated examination of grain problems and policies on a wide scale. The LIFT program was designed and implemented to reduce grain inventories sharply in 1970-71. As a component of this program, the quota system was reshaped to provide added incentive for a reduction in wheat production. Wheat deliveries were based on summerfallow and the increase in forage acreage; thus the greater the participation, the greater the delivery opportunity. Quotas for other grains were based on seeded acres plus assigned summerfallow acres.

As a result of the operation of the quota system under LIFT, the report of the Boden Committee on Quota Policy, the report of the Federal Task Force on Agriculture, and the report of the Grain Production Policy Group, a decision was made to implement the assignable acreage quota system in 1971-72. The primary objectives of this system are orderly marketing and supply control. Farmers may assign their assignable acreage base—seeded acreage plus summerfallow plus several adjustments—to any crop they choose. Delivery rates for each

¹The number of bushels deliverable per unit changed several times during the period reflecting relative changes in prices.

crop are based on quota acreage, the total acres assigned to each crop. Quota levels will increase sequentially by shipping block, and specific grades may be called for delivery in accordance with demand. An attempt will be made to equalize delivery rates across shipping blocks only if this does not necessitate congesting marketing channels with unmarketable supplies. The control of aggregate supply in relation to expected demand will be attempted by announcing likely quota levels and initial payments prior to seeding.

In general, it may be concluded that the practice of supply management has been formally adopted as a policy for the prairie grain industry. Whereas in the past, quota policy was aimed primarily at orderly marketing, the present now sees quota policy, in view of the need to avoid costly buildups in inventory, as a tool of *both* orderly, marketing *and* supply control—i.e., supply management.

REFERENCES

- Boden, E. A. et al., 1970. *Report on Delivery Quota System for Western Canadian Grain*. Winnipeg: CWB, February.
- Canada Department of Agriculture, 1969. "The Grain Delivery Quota System of the Canadian Wheat Board." *Canadian Farm Economics*, 4:3, August.
- Canadian Wheat Board, 1935-36 through 1968-69. *Annual and Supplementary Reports*. Winnipeg: CWB.
- House of Commons, 1942. "Minutes of Proceedings and Evidence No. 2," *Standing Committee on Agriculture and Colonization*. Ottawa: Queen's Printer, May 4.
- Lang, The Honorable O. E., 1970. *Prairie Grains Policy: Proposals* Bulletin. Ottawa: Office of the Grains Group, November.
- Lang, The Honorable O. E., 1971. "Prices and Quotas." *Prairie Grains Policy No. 2*. Ottawa: Office of the Grains Group, March 1.
- McLeod, A. D. and A. W. Laughland, 1969. *The Grain Delivery Quota System: A Report for Discussion*. Regina: Research Division, Saskatchewan Wheat Pool, May.
- Pearson, G. G., 1971. "Analysis of Quota Policy Problems, Objectives, and Alternatives in the Western Grain Industry." Unpublished M.Sc. thesis. Edmonton: The University of Alberta, Department of Agricultural Economics and Rural Sociology.

AIRCRAFT VERSUS GROUND METHODS FOR SPRAYING POTATOES IN NEW BRUNSWICK

Problem: Heavy spraying machinery may cut potato yields.

Solution: Spray by aircraft where possible.



*Laurie Philpotts**

Heavy machinery is damaging the potato crop. At least, many New Brunswick growers think so. They suspect that the wheels damage the potatoes and that the weight of large machines causes soil compaction. Furthermore, growers have observed that the tracked rows are often wetter than the non-tracked rows.

In 1968, a commercial New Brunswick grower measured the yield loss caused by machinery wheels in a test plot of just over one acre. The yield of rows adjacent to wheel tracks was 14,000 pounds. In the same field, the rows not affected by machinery wheels yielded 17,580 pounds. Thus, twenty barrels of potatoes were lost by wheel damage and/or soil compaction.

*Mr. L. E. Philpotts is a member of the Farm Management and Agricultural Adjustment Division, Economics Branch, CDA, Ottawa. K1A 0C5. This study was done in conjunction with the NRC Associate Committee on Agricultural and Forestry Aviation. Other projects on this topic are underway in the U.S.A. and the Netherlands. Interested readers are encouraged to contact Mr. Philpotts.

In the fall of 1970, a more comprehensive investigation was made to determine the yields of potatoes on farms where both aircraft and ground machinery were used for spraying.

Method of Study

Four producers agreed to assist in making general economic comparisons between the use of aircraft and ground machinery on their farms. One of the aerial spraying firms suggested that these farms represented nearly 10 percent of the farms which use aircraft services in New Brunswick.

The following items were determined in each case:—acreage; yield; cost per acre for aircraft; cost per acre for aircraft support; cost per acre of ground machinery operations and associated labor; cost per acre for pesticide materials; number of sprayings and average price per barrel of the potato crop to the farmer.

Capital investment, depreciation, and operating costs for ground machinery were not calculated individually, so average values were used.

The data obtained did not include the costs of preparing the soil, fertilizing, seeding and harvesting, since these operations and costs would be the same on the same land whether aerial or ground sprayed. The same variety of potato (Netted Gem) was grown in all cases.

The fields sprayed by aircraft varied in size from 40 to 150 acres. On the other hand, the fields sprayed by ground methods ranged from 15 to 25 acres. The number of acres did not represent the total acreage of potatoes on each farm, only the Netted Gems.

During the 1970 season, the aircraft service was used eight times on each area. Ground machinery was used to spray pesticides eight times also, with the exception of one farm which used six applications.

Results

The average yield from the fields sprayed by aircraft was 149 barrels per acre, in comparison to an average of 142.5 barrels per acre where ground methods were used.

The actual data obtained on the four farms are given in Table 1.

TABLE 1—DIRECT COMPARISON OF AVERAGE YIELDS ON EACH FARM (BARRELS PER ACRE).

Aircraft	Sprayed by	
	Ground	Equipment
157	137	
150	140	
150	143	
140	150	

The differences in crop yield on the areas treated by aircraft application ranged from an increase of 20 barrels per acre to a decrease of 10 barrels per acre. With respect to this decrease, the farmer stated that the field had a relatively poor yield due to a combination of climate and poor management at the end of the season, and was not the fault of the aircraft. Further, he stated that he was reluctant to have the data recorded in this study. If this area were, in fact, eliminated from the comparison, then the average yields would be 152 with aircraft application and 140 with ground machinery application.

The average cost of spraying (per season), including the pesticide materials, was as follows.

	Range (\$ per acre)	Average (\$ per acre)
aircraft.....	21.60-24.20	22.85
ground equipment.....	11.90-18.00	14.87

The chemical and application rate was the same for both aircraft and ground equipment on each farm. Thus, the average cost of applying pesticide materials by aircraft was greater by about eight dollars per acre per season (or one dollar per application).

The average price paid to the farmer for the potato crop was about \$2.60 per barrel, and ranged from \$2.50 to \$2.65. Using the average yields and calculated costs, the differences in income are shown in Table 2.

Assuming the same costs of cultivation, fertilizer, planting, and harvesting, Table 2 demonstrates that an average increase in profit per acre of \$8.92 may

TABLE 2—RETURNS PER ACRE BASED ON AVERAGE YIELD FOR AIRCRAFT VERSUS GROUND METHODS IN SPRAYING NETTED GEM POTATOES IN NEW BRUNSWICK, 1970

	Price per barrel to the farmer		
	Average \$2.60	Low \$2.50	High \$2.65
Aircraft services based on average yield of 149 barrels per acre—			
Average total income per acre.....	387.40	372.50	394.85
Average cost to spray per acre.....	22.85	22.85	22.85
Average total income per acre less cost to spray.....	364.55	349.65	372.00
Ground method based on average yield of 142.5 barrels per acre—			
Average total income per acre.....	370.50	356.25	377.63
Average cost to spray per acre.....	14.87	14.87	14.87
Average total income per acre less cost to spray.....	355.63	341.38	362.76
Average income gain per acre by using aircraft services.....	8.92	8.27	9.24

be achieved by using aircraft to spray Netted Gem potatoes in New Brunswick. At the highest price to the farmer of \$2.65 per barrel, an average increase of about \$9.25 per acre is indicated.

Conclusions

The results obtained from this study indicate that the application of pesticides to potato fields by aircraft, compared to ground equipment, is advantageous because of:—

1. Higher yields per acre.
2. Higher net returns per acre.

The study was limited in scope, but the results demonstrate that further investigation is warranted. This should include the effects of increased util-

ization upon the costs of aircraft services. Perhaps increased use of aircraft would lower costs per acre.

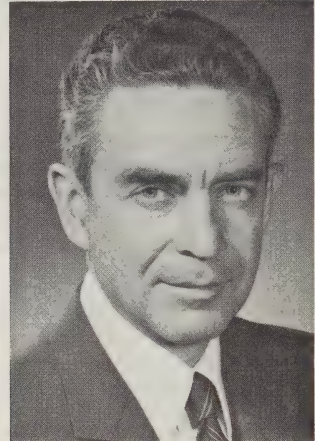
Not all potato fields on the varied land forms of New Brunswick could be efficiently sprayed by aircraft, due to comparatively rugged terrain and/or field boundary obstructions. Further, the size of field has a bearing upon whether or not aircraft services should be used. Aerial sprayers have indicated that it would not be profitable to spray a field of less than 10 acres, even though such a field may be part of a farm total of at least 100 acres of potatoes. The percentage of the total area which is suitable for aircraft application is not known, but stereoscopic aerial photography would be of assistance in forming an estimate.

PERSPECTIVE ON THE CANADIAN HONEY INDUSTRY

***Production is moving to the Prairies
along with the seed crops.***

***Both Canadian production and world
production are rising.***

***Imported honey prices are rising while
Canadian export prices are dropping.***



*Bob Burns**

Some eight thousand beekeepers in Canada produced about 51 million pounds of honey in 1970. This was approximately 22 percent more than the 1964-68 average of 41.8 million pounds. At an estimated 16.2 cents per pound average farm price, 1970 income was \$8.2 million from the sale of honey. Income from honey and beeswax was 0.21 percent of the total cash receipts for all farm operators in Canada last year.

Production

World production is increasing. The 1960-64 average was estimated at 884.6 million pounds and by 1969 had more or less steadily increased to 968.8 million pounds. Russian production is variously estimated from 200 to 400 million pounds, but Chinese exports are known at about 40 million pounds. Most other countries show stable to moderately increasing production, but Mexico rose from a 1960-64 average of 59 million to 79 million pounds in 1969, an increase of 33 percent.

Canada produces between two and five percent of the world supply and is the fourth or fifth largest producer ranking behind United States, Mexico, Russia and the People's Republic of China.

In the five years, 1964 to 1968, Canadian production ranged from a low of 33 million pounds to a high of 49 million. A record crop of 53 million pounds was produced in 1969. Similarly, Canadian average yields ranged from a low of 81 pounds per colony in 1968 to 127 in 1969 and were among the highest in the world. Average yields on the Prairies have ranged as high as 197 pounds per colony. The number of beekeepers dropped steadily from 10,760 in 1964 to 8,430 in 1970. The number of colonies also dropped steadily; but at a lesser rate, so that the number of colonies per beekeeper rose 33 percent—from about 36 in 1964 to 48 in 1970.

Over the past 12 years, production has shifted from eastern Canada to the Prairies, mainly because of the large and expanding seed growing areas and their higher potential yields. Alberta is now the largest producer, and, together with the other Prairie Provinces, accounts for about two thirds of the Canadian total.

*Mr. J. R. Burns is a Marketing and Trade economist and Acting Chief of the Outlook Section, Economics Branch, CDA, Ottawa. K1A 0C5.

TABLE 1—PRODUCTION OF HONEY, CANADA AND PROVINCES, 1959-63 TO 1970-71

	Average 1959-60 to 1963-64	Average 1964-65 to 1968-69	1969-70	1970-71
thousand pounds				
Prince Edward Island.....	57	47	34	28
Nova Scotia.....	187	225	214	201
New Brunswick.....	85	106	129	129
Quebec.....	3,294	2,742	3,501	2,548
Ontario.....	10,487	9,199	8,986	7,636
Manitoba.....	6,170	6,824	9,250	9,300
Saskatchewan.....	4,258	6,027	8,668	7,611
Alberta.....	1,148	14,128	20,280	20,240
British Columbia.....	1,646	2,578	2,250	3,348
Canada.....	34,333	41,875	53,312	51,041

Crop Year—July 1 to June 30.

TABLE 2—HONEY: SUPPLY, DISPOSITION AND PRICES, CANADA, 1959-63 TO 1971-72

	Average 1959-60 to 1963-64	Average 1964-65 to 1968-69	1969-70	1970-71
thousand pounds				
Stocks, July 1 ^a	8,677	12,422	8,568	15,563
Production.....	34,333	41,875	53,312	51,041
Imports.....	2,233	2,985	693	
Total Supply.....	45,243	57,282	62,573	
Exports.....	3,370	6,858	5,988	17,420
Available for Domestic Use.....	41,873	50,424	56,585	
Stocks, June 30 ^a	8,523	12,477	15,563	
Apparent Domestic Disappearance.....	33,350	37,947	41,022	
Net Trade (dollars).....	+1,137	+3,873	+5,295	
Average Farm Price Per Pound.....	0.170	0.178	0.165	0.162 ^b

Crop year—July 1 to June 30.

^a Wholesalers' stocks, included 1959-66, are excluded from 1967 to date.^b Preliminary.

Supplies

Stocks on July 1 in the past few years show large increases over the 1959-63 averages. As production has increased, imports have declined and exports have increased to more than double. Exports rose from an average of 3.3 million pounds during 1959-63 to 6.8 million during the next five year period. In 1969-70 they were 5.9 million, and for this past crop year exports will be well over 18 million pounds. Apparent domestic disappearance has increased steadily, but per capita disappearance has decreased from 2.3 pounds in 1965, to 1.6 pounds in 1968, to 1.9 pounds in 1969. On the other hand, per capita consumption of all sugars and syrups has increased from 108.4 pounds in 1965 to 110.5 pounds in 1969.

Prices

Average prices have not fluctuated as much as production. The average farm price during the five year period 1959-64 was 17 cents a pound. In 1964-69, it was 17.84 cents. During the past two years, it dropped to 16.5 and 16.2 cents respectively, but has risen lately with higher recent world prices. Prices of imported honey have jumped from 15.3 cents per pound in the 1965 calendar year to 34.6 cents during 1970. Export prices, however, show the opposite trend dropping from 26.2 cents to 20.7 cents over the same period. Prices increased for imports into Canada mostly because of a switch from bulk honey to packaged honey. Similarly, average export prices per pound decreased because Canada has been exporting bulk honey rather than packaged honey.



Conclusions

Record exports in 1970-71 have reduced the Canadian surplus stock to manageable proportions. But this has been done at the expense of exporting bulk honey rather than a more sophisticated product. Increases in Canadian production, however, have kept Canada in a surplus position. With Canadian honey consumption per capita unchanging, or perhaps declining, Canada is dependent on world markets to take this excess supply.

The Canadian honey industry has been in a precarious position, because concurrent with large increases in production, there has been a large build-up of stocks. Prices moved downward because of this surplus position. Because of the world supply situation and the marketing and pricing policies of Canadian cooperatives, downward changes have not been as drastic as they might have been. A mitigating factor has been favorable variations in world supplies. When Canadian production was high, production in some other countries was comparatively low and *vice versa*. Thus the continuing surplus has been manageable.

Another important factor has been the high quality of Canadian honey which has good acceptance on world markets. However, should Canada produce

several large crops concurrent with large world crops, low world prices would force Canadian prices down, possibly reduce exports and restore high stock levels. Net returns to beekeepers could be drastically reduced with a subsequent reduction in the number of beekeepers and colonies. This would likely reduce the number of honey bee pollinators and thus affect the fruit, forage and seed crops dependent upon this kind of pollination.

One way of reducing high stock levels would be to increase per capita consumption by promoting honey. There may be some potential in this, but it will not necessarily mean that Canadian honey will be used exclusively. Export promotion might be a partial answer, but increasing world production will present stiff competition which can only be met by efficient production and low prices.

Honey is a product for which Canada has some competitive advantage. Average yields in Canada are much higher than in the United States and in other large producers. Canada produces comparatively large quantities of high grade white honey which is in great demand, whereas most of the world production is darker honey. Canadians can compete, but only practical production techniques and aggressive marketing programs can keep Canadian honey in world markets.

CHANGES IN THE PRIMARY SECTOR OF THE CANADIAN MANUFACTURING MILK AND CREAM INDUSTRY 1970-71

*H. J. Mestern**

***There are half as many cream shippers
as there were in 1966-67 because many
have switched to milk production.***

Introduction

Substantial changes continue to occur at all levels of the primary sector of Canada's manufacturing dairy industry. Yang (1, 2, 3) has recorded the progress toward an industry that is increasingly characterized by fewer and larger units of production. While Yang's data are entirely taken from the records of the Canadian Dairy Commission (C.D.C.), Furniss (4) has analyzed the dairy industry in Quebec and Ontario, using specially selected 1966 Census data. The dairy industry is getting very close scrutiny. Demands for up-to-date data are frequently made by those who must make decisions on policies and programs which affect producers and manufacturing establishments. There is a growing need to follow regional developments. This article will update the data on the manufacturing milk and cream producers who registered with the C.D.C. from April 1, 1970 to March 31, 1971 and who made deliveries to manufacturing plants during this period (5).

Program Data of the Canadian Dairy Commission

Producers of milk and cream for manufacturing purposes have been registered with the C.D.C. for purposes of subsidization since the inception of the Commission in 1966-67, and even several years before that time. While C.D.C. records cannot make the claim to cover completely all producers who sell milk and cream to factories, it is estimated that the records include 95 percent of all producers in Canada who ship to manufacturing milk plants, and 98 percent of total shipments.

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Number of Shippers and Distribution by Province

The number of producers in 1970-71 stood at 102,774 compared with 115,829 in the preceding year, a reduction of some thirteen thousand or about 11 percent. (Table 1) A reduction rate of this magnitude has prevailed since 1966-67, the first year for which comparable data were available (1).

Cream Shippers

A larger than average adjustment has occurred among producers who separate their milk on the farm and market only the butterfat as "cream". Since 1966-67, the number of cream shippers has dropped by one half to 54,233 in 1970-71. The cream industry is increasingly concentrated in the Prairie Provinces where two thirds of the cream shippers reside.

Typically, the decline in the number of cream shippers can be related to two causes. The obvious one is that producers stop milking cows. They may do so for reasons of age or health, or because they wish to utilize their resources in alternatives on the farm or elsewhere. Incidentally, this cause for decline applies equally to manufacturing milk producers. The other is a purely statistical one. In changing his marketing from cream to whole milk, a producer is dropped from the group of cream shippers and is added to the group of milk shippers.

In the Prairies, the natural and economic circumstances have favoured small scale cream production which supported relatively small creameries. In recent years, Alberta and Manitoba manufacturing estab-

TABLE 1—NUMBER OF PRODUCERS SHIPPING MANUFACTURING MILK AND CREAM CANADA AND PROVINCES, 1966-67 THROUGH TO 1970-71

						% Change	
	1966/67	1967/68	1968/69	1969/70	1970/71	1970/71 1969/70	1970/71 1966/67
Numbers of Producers							
Manufacturing Milk							
Canada.....	68,577	65,189	60,614	55,429	50,080	-9.7	-27.0
P.E.I.....	1,008	948	818	697	621	-10.9	-38.4
N.S.....	201	182	151	126	91	-27.8	-54.7
N.B.....	429	385	325	239	158	-33.9	-63.2
Que.....	41,761	40,618	38,160	35,185	32,556	-7.5	-22.0
Ont.....	22,206	20,066	18,457	16,772	14,542	-13.3	-34.5
Man.....	716	830	813	795	733	-7.8	+2.4
Sask.....	12	25	22	27	31	+14.8	+158.3
Alta.....	1,950	1,839	1,651	1,477	1,320	-10.6	-32.3
B.C.....	294	296	217	111	28	-74.8	-90.5
Cream							
Canada.....	103,527	88,894	73,006	62,461	54,233	-13.2	-47.6
P.E.I.....	3,043	2,690	2,325	2,038	1,823	-10.5	-40.1
N.S.....	2,350	2,084	1,676	1,340	998	-26.3	-57.5
N.B.....	2,847	2,502	2,074	1,799	1,509	-16.1	-47.0
Que.....	16,572	12,053	9,216	7,735	6,706	-13.3	-59.5
Ont.....	15,455	12,954	10,449	8,706	7,312	-15.9	-52.7
Man.....	15,803	13,903	11,636	10,143	8,919	-12.1	-43.6
Sask.....	23,453	20,968	17,332	15,214	13,698	-10.0	-41.6
Alta.....	23,390	21,185	17,881	15,198	13,037	-14.2	-44.3
B.C.....	614	555	417	288	231	-19.8	-62.4
Total Producers*							
Canada.....	165,061	149,457	130,464	115,829	102,774	-11.3	-37.7
P.E.I.....	3,868	3,490	3,050	2,686	2,400	-10.6	-38.0
N.S.....	2,503	2,212	1,779	1,444	1,068	-25.9	-57.3
N.B.....	3,214	2,836	2,345	2,012	1,657	-17.6	-48.4
Que.....	53,342	49,660	45,420	41,710	38,312	-8.1	-28.2
Ont.....	36,515	32,208	28,260	25,040	21,568	-13.9	-40.9
Man.....	16,333	14,476	12,301	10,765	9,533	-11.4	-41.6
Sask.....	23,459	20,979	17,351	15,231	13,717	-9.9	-41.5
Alta.....	24,940	22,767	19,339	16,549	14,265	-13.8	-42.8
B.C.....	887	829	619	392	254	-35.2	-71.4

* Total of milk and cream does not add up exactly because of "Dual" shippers who ship both milk and cream.

lishments have processed an increasing quantity of manufacturing milk, thus affording producers an opportunity to change from cream to milk marketing. Nevertheless, the general long term trend has been a reduction of cream shippers. This trend started long before the Commission started its operation. The number of cream shippers in Manitoba, Saskatchewan and Alberta was down from 62,000 in 1966-67 to 35,600 in 1970-71, a decline of 43 percent.

While the same numerical trend has occurred among cream shippers in central Canada, greater opportunity to shift deliveries to milk plants enabled a fairly large proportion of the outgoing cream shippers to move into the ranks of manufacturing milk producers. For example, the numbers of Quebec and Ontario cream shippers in 1970-71 were 6,706 and 7,312,

which were down from 1966-67 by 60 and 53 percent respectively.

Milk Shippers

As we have seen, the ranks of milk producers have been swelled by cream producers who switched to milk. As 'old line' milk producers dropped out, many were replaced by cream producers and as a result milk producers have declined less than cream shippers. Quebec and Ontario together accounted for 94 percent of the nation's manufacturing milk producers. Saskatchewan, which had the smallest number of manufacturing milk producers, thirty-one in 1970-71, had a few additions which showed up as a large percentage gain. Even though their number is small, there are substantial milk producers in Al-

berta, Manitoba and Prince Edward Island, who become of increasing importance to the dairy industry of their province as they grow in scale of operation.

Quantity of Butterfat Marketed

The uptrend in total shipments of butterfat peaked in 1968-69 with a total of 346.7 million pounds. This uptrend in shipments was accompanied, as we have seen, by a reduction in producer numbers. This indicated an improvement in the productivity of the resources which were largely reallocated and consolidated into ongoing production units. (Table 2)

In 1969-70, and again in 1970-71, deliveries were reduced by 0.6 and 10 percent respectively, falling to 310.2 million pounds of butterfat in 1970-71.

Cream Marketings

As cream shipments dropped further in 1970-71, cream's share of manufacturing butterfat fell to 24.2 percent, compared with 25 percent in 1969-70, and 32.6 percent at the beginning of 1966-67. This substantial decline can be traced primarily to the very sharp reduction in Quebec cream shipments which were half as large in 1970-71 as in 1966-67.

Elsewhere in Canada, the reduction in cream shipments was less pronounced. The decline in the quantity of butterfat marketings generally followed the downturn in the number of cream producers.

Manufacturing Milk Marketings

Milk shipments, which reached a high of 270 million pounds of butterfat in 1969-70, showed a decline of

TABLE 2—QUANTITY OF BUTTERFAT SHIPPED BY PRODUCERS OF MANUFACTURING MILK AND CREAM

	% Change						
	1966/67	1967/68	1968/69	1969/70	1970/71	1970/71 1969/70	1970/71 1966/67
Thousand pounds Butterfat							
Manufacturing Milk							
Canada.....	232,581	244,047	259,010	260,986	235,183	-09.9	+01.1
P.E.I.....	1,812	1,968	1,993	1,998	1,935	-03.2	+06.8
N.S.....	349	381	364	344	218	-36.6	-37.5
N.B.....	787	839	815	644	499	-22.5	-36.6
Que.....	121,673	132,709	144,871	153,715	143,124	-06.9	+17.6
Ont.....	99,153	97,332	99,116 ^a	92,455 ^a	77,427 ^a	-16.3 ^a	-21.9 ^a
Man.....	1,237	2,220	3,050	3,542	3,799	+07.3	+207.1
Sask.....	20	42	56	56	68	+21.4	+240.0
Alta.....	6,685	7,638	7,857	7,817	7,998	+02.3	+19.6
B.C.....	865	918	888	415	115	-72.3	-86.7
Manufacturing Cream							
Canada.....	112,505	95,463	87,738	83,720	75,057	-10.3	-33.3
P.E.I.....	3,879	3,600	3,531	3,591	3,333	-07.2	-14.1
N.S.....	1,672	1,462	1,253	1,162	949	-18.3	-43.2
N.B.....	3,332	3,021	2,718	2,838	2,518	-11.3	-24.4
Que.....	22,704	16,576	14,083	13,755	11,477	-16.6	-49.4
Ont.....	24,020	20,427	18,407	16,742	15,219	-09.1	-36.6
Man.....	15,030	13,095	12,401	11,866	10,043	-15.4	-33.2
Sask.....	15,600	13,558	12,982	12,773	12,077	-05.4	-22.6
Alta.....	22,795	23,347	22,033	20,739	19,229	-07.3	-25.5
B.C.....	473	377	332	254	212	-16.5	-55.2
Total							
Canada.....	345,094	339,511	346,748	344,706	310,240	-10.0	-10.1
P.E.I.....	5,691	5,568	5,522	5,589	5,268	-05.7	-07.4
N.S.....	2,021	1,843	1,618	1,506	1,167	-22.5	-42.3
N.B.....	4,120	3,860	3,533	3,482	3,017	-13.4	-26.8
Que.....	144,377	149,286	158,954	167,469	154,601	-07.7	+07.1
Ont.....	123,173	117,759	117,522 ^a	109,197 ^a	92,646 ^a	-15.2 ^a	-24.8 ^a
Man.....	16,267	15,315	15,451	15,409	13,842	-10.1	-14.9
Sask.....	15,620	13,600	13,038	12,829	12,145	-05.3	-22.2
Alta.....	32,487	30,985	29,890	28,556	27,227	-04.7	-16.2
B.C.....	1,338	1,296	1,220	669	327	-51.1	-75.6

^a Ontario reduction is overstated because of shift of producers to the Fluid Pool (Group I Pool).

about 10 percent to 235.2 million pounds in 1970-71. This was less than for cream. Milk increased its share of the total supply to 76 percent nationally. Provincially, there was a slight reduction in the share of manufacturing milk shipped by registered producers in Quebec and Ontario from 94.3 to 93.8 percent. This difference was principally in favour of Alberta, which increased its marketings of whole milk by 21.4 percent and its share of manufacturing milk from 3 to 3.4 percent of the national shipments of registered producers.

Average Marketing per Producer

Cream

The cream producers who continued to ship have steadily increased their production by about 6 per-

cent per year between 1966-67 and 1970-71. (Table 3) The significant continuing difference between the average level of cream and milk production highlights the fundamental economic difference that exists between milk and cream production. The average cream shipment has remained about one-third as large as the average manufacturing milk shipment.

Milk

A general measure of the increase in productivity which accompanied the adjustment in the industrial milk and cream sectors is the substantial improvement in average milk shipments per farm. They have risen from 97,000 pounds of milk (3,392 pounds of butterfat) in 1966-67 to about 134,000 pounds (4,696 pounds of butterfat) in 1970-71. The increase in productivity averaged about 10 percent per year. Provinces which started from a lower point on the growth

TABLE 3—AVERAGE QUANTITY OF BUTTERFAT SHIPPED BY MANUFACTORY MILK AND CREAM PRODUCERS

						% Change	
	1966/67	1967/68	1968/69	1969/70	1970/71	1970/71 1969/70	1970/71 1966/67
Pounds Butterfat							
Manufacturing Milk							
Canada.....	3,392	3,744	4,273	4,708	4,696	-00.3	+38.4
P.E.I.....	1,798	2,076	2,436	2,866	3,116	+08.7	+73.3
N.S.....	1,736	2,094	2,412	2,730	2,396	-12.2	+38.0
N.B.....	1,835	2,179	2,506	2,695	3,157	+17.1	+72.0
Que.....	2,914	3,267	3,796	4,369	4,396	+00.6	+50.9
Ont.....	4,465	4,851	5,370	5,512	5,324	-03.4	+19.2
Man.....	1,727	2,675	3,751	4,456	5,183	+16.3	+200.1
Sask.....	1,648	1,692	2,546	2,079	2,195	+05.6	+33.2
Alta.....	3,428	4,153	4,759	5,292	6,059	+14.5	+76.8
B.C*.....	2,941	3,102	4,093	3,738	4,091	+09.4	+39.1
Manufacturing Cream							
Canada.....	1,087	1,074	1,202	1,304	1,384	+06.1	+27.3
P.E.I.....	1,275	1,338	1,518	1,762	1,828	+03.7	+43.4
N.S.....	711	702	748	867	951	+09.7	+33.8
N.B.....	1,170	1,208	1,311	1,578	1,669	+05.8	+42.6
Que.....	1,370	1,375	1,528	1,778	1,712	-03.7	+25.0
Ont.....	1,554	1,577	1,762	1,928	2,081	+07.9	+33.9
Man.....	951	942	1,066	1,170	1,126	-03.8	+18.4
Sask.....	665	647	749	840	882	+05.0	+32.6
Alta.....	1,103	1,102	1,232	1,365	1,475	+08.1	+33.7
B.C.*.....	771	680	795	883	918	+04.0	+19.1
Total							
Canada.....	2,091	2,272	2,658	2,976	3,019	+01.4	+44.4
P.E.I.....	1,471	1,596	1,810	2,081	2,195	+05.5	+49.2
N.S.....	807	833	909	1,043	1,093	+04.8	+35.4
N.B.....	1,282	1,361	1,507	1,731	1,821	+05.2	+42.0
Que.....	2,707	3,006	3,500	4,015	4,035	+00.5	+49.1
Ont.....	3,373	3,656	4,159	4,361	4,296	-01.5	+27.4
Man.....	996	1,058	1,256	1,431	1,452	+01.5	+45.8
Sask.....	666	648	751	942	885	+05.1	+32.9
Alta.....	1,303	1,361	1,546	1,726	1,909	+10.6	+46.5
B.C.*.....	1,508	1,563	1,971	1,707	1,286	-24.7	-14.7

*Manufacturing milk and cream producers in B.C. are not typical of B.C. fluid pool producers.

curve at the beginning of the period under review have made even more substantial advances. Manitoba averages surged ahead by 200 percent to a level of about 148,000 pounds of milk (5,183 pounds of butterfat) between 1966-67 and 1970-71. Second and third largest gains were accomplished in Alberta and Prince Edward Island with 77 and 73 percent respectively. Highest production occurred in Alberta.

Summary

The manufacturing milk and cream sectors of the Canadian dairy industry encompassed 102,774 producers in 1970-71. Forty-eight percent were milk producers and 52 percent were cream shippers. The milk shipper produced an increasing share of the total supply of manufacturing milk, reaching 76 percent in 1970-71. Average production of milk stood at 4,696 pounds of butterfat per year per farm, which is three times the average production of cream. Productivity in milk production per farm increased by an average of ten percent annually.

NOTES AND REFERENCES

1. Yang, W.Y. "Changes in the Manufacturing Milk and Cream Industry under the Canadian Dairy

Commission in 1969-70", *Canadian Farm Economics*, Vol. 5, No. 5, December 1970, pp. 38-42.

2. Yang, W. Y. "Changes in Producers' Shipments of Manufacturing Milk and Cream under the Operation of the Canadian Dairy Commission", *Canadian Farm Economics*, Vol. 5, No. 1, April 1970, pp. 25-32.
3. Yang, W. Y. "Quota Applicants of the Canadian Dairy Commission in 1969 . . .", *Canadian Farm Economics*, Vol. 5, No. 2, June 1970, pp. 6-21.
4. Furniss, I. F. "Basic Parameters of the Primary Dairy Industry in Ontario and Quebec". Part I: *Canadian Farm Economics*, Vol. 5, No. 4, October 1970, pp. 11-24. Part II: *Canadian Farm Economics*, Vol. 6, No. 2, June 1971, pp. 29-47.
5. Shipments are the deliveries of milk and cream by farmers to dairy plants. In this paper, all shipments are stated in pounds of butterfat even though 'milk shippers' deliver whole milk and 'cream' shippers deliver farm separated cream.

POLICY AND PROGRAM DEVELOPMENTS

PRAIRIE FARM ASSISTANCE (Regulations Amended)

The Prairie Farm Assistance Regulations have been amended to suspend, temporarily, the collection of the one percent levy on sales of grain marketed by western farmers.

Effective on the first of August 1971, collection of the levy will be suspended pending final disposition of legislation now before Parliament, which if passed, will provide for discontinuation of the levy and a general phasing out of PFAA by the end of the 1971-72 crop year.

Suspension of the levy will not affect the payments which will be made as usual to farmers with lands in eligible crop failure areas following harvest of this year's crop. The Prairie Farm Emergency Fund from which payments to farmers are made has a credit balance at the present time, which appears to be large enough to cover any payments that might be required for the 1971 crop. (July, 1971)

AGRICULTURAL PRODUCTS MARKETING ACT (Ontario Wheat Producers' Marketing Order)

This Order-in-Council provides for a minor modification of the Marketing Order to ensure the legality of collecting levies. Subsection 2 of Section 5 fixes the maximum level of levies, and Subsection 3 indicates that these levies expire on June 30, 1971. Since that deadline is past, and Subsections 2 and 3 have expired, Section 5 has been changed to a simple authorization for collecting levies.

Federal control will continue over the rate of levies, since levels cannot change without a new Order being made by the Board. Publication in *Canada Gazette* will mark Federal approval of such Orders. (September, 1971)

AGRICULTURAL PRODUCTS STANDARDS ACT (Fresh Fruit and Vegetable Regulations)

The Canada Agricultural Products Standards Act provides authority for the regulation of fresh fruit and vegetables. The last regulations were issued by an Order-in-Council in 1968. Many amendments have since been sought by the industry through the Canadian Horticultural Council. A revised set of

regulations has therefore been prepared by the Canada Department of Agriculture and details of the regulations are being published in *Canada Gazette*.

The most important item in the requested amendments is the addition of Newfoundland blueberries to the list of products requiring compulsory inspection prior to interprovincial or export shipment. (September, 1971)

CANADIAN WHEAT BOARD ACT (Oats and Barley)

The Governor General in Council has approved the Canadian Wheat Board Regulations establishing the sums to be paid to producers selling and delivering oats and barley to the Board during the period August 1, 1971 to July 31, 1972. This was made following the previous extension of Parts III and IV of the Canadian Wheat Board Act to oats and barley for the crop year commencing August 1, 1971 to July 31, 1972. The Order-in-Council issued July 20, 1971 also fixed the sum to be paid for oats of the grade No. 2 Canada Western at sixty cents per bushel, and the sum to be paid for barley of the grade No. 3 Canada Western Six Row at ninety-one cents per bushel. A more detailed schedule of prices for the different grades of oats and barley is available from the Canadian Wheat Board or in *Canada Gazette* Vol. 105 No. 16.

(Wheat)

The Order-in-Council issued on the 29th of July also fixed the sum to be paid for wheat of the grade No. 1 Manitoba Northern at \$1.46 per bushel, basis in store Thunder Bay or Vancouver. A complete schedule of the sums to be paid to producers selling and delivering wheat to the Board for the 1971-72 crop year is now available from the Board or in *Canada Gazette* Vol. 105 No. 16. (August, 1971).

CANADA GRAIN ACT (Order Establishing Off Grades of Grain and Grades of Screenings)

The Canadian Grain Commission pursuant to Section 16 of the Canada Grain Act has amended the Order Establishing Off Grades of Grain and Grades of Screenings. No. 1 Canada Western Red Spring Wheat has been excluded from the grains that can be rejected on account of odour or excessive admixture following Sections 6 and 7 of the Order.

Section II has been modified to establish a specific off grade of grain for any western wheat or rye, except No. 1 Canada Western Red Spring Wheat,

rejected on account of excessive heated grain. Section 14, establishing an off grade on account of ergot, has been revoked. (August, 1971)

WHAT IS HAPPENING ABROAD IN POLICY AND PROGRAM DEVELOPMENTS

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Canada Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

Canada—Austria's Top Supplier of Durum Wheat

The chief suppliers of wheat to Austria, in 1970, were:

	<i>metric tons</i>
Seed wheat —Canada	100
Other wheat —The Federal Republic of Germany	232
USSR	7,320
Canada	16,836

Canada is likely to remain Austria's top supplier of Durum wheat, as all large millers prefer Canada's grading system and the constant good quality of its wheat. The Canadian Wheat Board has invited an Austrian mission, made up of government officials and millers, to visit Canada this fall and familiarize themselves with Canadian production and marketing practices and technology.

Austria's exports of wheat, in 1970, totaled 10,500 metric tons valued at \$732,000. Most of these exports went to Romania. (Canadian Commercial Officer, Vienna)

World Grain Review

The seeding of grain crops for the 1971-72 season has been completed in the Northern Hemisphere and harvesting of winter-sown grains is now underway in many countries. With bigger acreages sown to wheat and barley and with generally good growing conditions, bumper harvest of these grains are forecast for North America and Europe. The acreage under corn is also greater and, despite the uncertainty about the extent of blight damage in the United States, the harvest is now expected to be larger than last year. Acreages in oats and rye are estimated to be little different from last season but, with improved yield prospects, output should be larger.

Because of the strong demand for grains from the Middle East, Japan, South America, and the tradi-

tional markets in Western Europe, the level of international trade has continued well above that of last season. The combined exports of the principal grains, so far recorded for 1970-71 by the chief exporting countries, are now estimated to be nearly 12 percent larger than in 1969-70. Wheat and barley have accounted for most of the increase in absolute terms but the expansion has been proportionately greater for oats and rye. Shipments of corn recorded so far are about the same as last season. The United States is again the main exporter of wheat and corn, Canada the leading shipper of barley and rye, and Australia the biggest trader in oats.

The tone of international grain markets has continued to be somewhat uncertain in recent weeks as international prices fluctuated with changing prospects for the new harvest. The recent forecasts that large crops are expected should be followed by lower prices at the start of the new marketing season. In Britain the new higher minimum import prices do not appear to have had much immediate effect on the market but must have a stabilizing influence on internal price levels if international prices move downwards. (Grain Bulletin, Commonwealth Secretariat, London, July, 1971).

Australian Wheat—Stiffer Competition Record Shipments

Australia has made record shipments of wheat to world markets for the first six months of the 1970-71 crop year. A total of 4.5 million tons have been shipped in the six months beginning December 1, 1970, exceeding the previous record set in 1966-67 by about 500,000 tons. Only 3,070,000 tons were shipped during the corresponding period of 1969-70.

Projections of total wheat sales in the current season stand at 335 million bushels. The estimate includes 260 million bushels to be sold on the export market, plus exports of 15 million bushels in flour, wheat equivalent—a total of 275 million bushels.

Home consumption, including stockfeed, flour and wheat for other purposes, is expected to reach 60 million bushels. Although shipments have been large to date, anticipated sales during the 1970-71 season will only equal the third best export year for Australia.

The disposal of 335 million bushels would leave a carryover of some 180 million bushels at 30 November 1971, a substantial reduction from the previous carryover of 265 million bushels.

Tailoring to Specific Markets

Increased attention was given to the segregation of wheat to meet discriminating world markets in 1969-70 and to the present. Wheats were offered on the basis of specific qualities of hardness, softness and protein levels; in all, 16 grades were segregated in 1969-70.

Further segregations will be made to tailor Australian wheats to specific markets. Examples include the production of a limited quantity of Durum wheat in New South Wales this season, as well as future segregation of wheat containing low protein in Victoria and Western Australia to supply a quality of wheat suitable for cakes and biscuits in Japan. (Canadian Assistant Commercial Secretary, Agriculture, Melbourne).

Re-Orientation of Australian Meat Exports

Larger Share of USA's Import Quota

Because of a threatened year-end strike by U.S. seamen, Australian meat exports to the USA (about \$295 million a year) could come to a complete standstill. In anticipation, the Australian meat office has provisionally suspended the plan for the diversification of meat exports. Instituted in 1968, the plan was aimed at reducing Australian dependence on the U.S. market and at stimulating sales to other potential markets. By lifting these restrictions on sales to the USA, it should be possible for Australia to fulfill her 1971 quota of 258,000 tons granted to her in 1971, and thus assure her a similar, if not a larger, share of the USA's import quota for 1972. The acceleration in exports to the USA will mean an appreciable reduction in sales to the U.K.—at least until the end of the year. In the first ten months of 1970-71, Australia exported 75,000 tons to the U.K., 6,000 tons more than in the corresponding period of 1969-70 while exports to the USA in both years fell below the target.

New Attitude to the USSR's and China's Markets

Another factor likely to influence Australian meat exports is the sharp change in the Australian attitude to the USSR and China since the new government came into office in May last year. When the Soviet Government made known its intentions to buy large quantities of beef, the Australian Government decided to make certain concessions which the Russians had been seeking for some time. A Soviet trade delegation and a branch of the Baltic Shipping Company will be permanently based in Sydney while an agricultural attaché will be appointed to the USSR embassy in Canberra. The Australian Prime Minister believes this will lead to the setting up of direct shipping links between Australia and Soviet Asia and a net increase in trade. There is a trend in Australian long term policies towards establishing normal trading relations with China. In spite of a decrease in cereal exports during the present season, the drawing up of large contracts for the sale of Australian goods at the recent Canton Fair shows a great boosting of Sino-Australian trade. An Australian information bureau is to be set up in Peking in the near future. (Agra Europe, London, 30 June 1971.)

Oils and Fats

Trade Liberalization in Japan

Liberalization of a group of 26 commodities, including oilseeds and vegetable oils, became effective on 30 June 1971. Both crude and refined oils were liberalized along with oilseeds.

The general consensus among people in the Japanese industry is that no competition from abroad will be possible since current Japanese prices of both oils and meals are too low for foreign firms to consider entry into the Japanese market. (Canadian Commercial Minister, Tokyo).

Livestock

Growing World Demand for Beef

World demand for meat will continue to be greater than supplies during the next 10 years, according to a prediction made in a study presented to a newly created international Study Group on Meat, at a meeting in June, at FAO headquarters in Rome.

Fifty-nine meat producing and consuming countries were represented at the week-long meeting. The participants came out with the prediction that world

demand for the four principal categories of meat—beef, veal, poultry and pork—is “likely to remain strong and prices of most meats will probably average higher” during the remainder of 1971 and 1972. Beyond that, the FAO report said, assuming constant prices, “the rising living standards and the expected population increase would raise world demand in 1980 for the four major categories of meat by about 35 million tons, or about 40 percent above the estimated 1970 actual consumption levels.”

Most of the demand in the world is for beef and veal—40 percent of the total—followed by pork and poultry, each accounting for about 30 percent.

Nearly 70 percent of the meat eaten in the developing countries comes from cattle and sheep, compared with less than 50 percent in the developed, industrial countries and somewhat over 33 percent in the centrally planned countries of East Europe and the USSR. (FAO Release, 25 June 1971).

General

New Records for U.S. Agricultural Exports

U.S. agricultural exports for the year ending June 30, 1971—estimated at \$7.7 billion—broke all previous records. The 15 percent advance over 1969-70 was sparked by sharp rises in exports of soybeans, soybean products and wheat. Other significant contributors were the larger shipments of cotton, feed-grains, slaughter cattle, inedible tallow, nuts, and dairy products.

The EEC took about \$1.8 billion worth of U.S. farm products—over a fourth more than in the previous year. Japan, the top country market, purchased over \$1.2 billion worth. (The Farm Index, USDA, August 1971).

Orchard Grubbing Subsidy for British Growers

A new orchard grubbing scheme has been announced by the Minister of Agriculture, with grants to encourage grubbing of uneconomic orchards of dessert and culinary apples and pears. The grant will be paid at a flat rate, equivalent to the full standard rate of grubbing and will be payable on applications received up to the end of March, 1973. A condition of the grant is that trees are not to be replaced within five years.

In Parliament, the Minister stated that fruit of indifferent quality from uneconomic orchards dis-

rupted the market for good quality fruit from efficient producers; only the latter could hope to maintain successful commercial production in the long term.

The new grant is consistent with the Minister's recent warning to the industry that in the event of British entry into the EEC, a large number of uneconomic orchards would not be able to compete and would go out of business.

The National Farmers' Union welcomed the special grant as “a valuable aid to growers who wish to cut out uneconomic acreages.” The N.F.U. warned, however, that growers should give careful consideration to the alternative crops that they produce to avoid surpluses in other foods. (Canadian Commercial Officer, Agriculture, London).

Need to Stabilize World's Marginal Lands

The urgency of stabilizing “marginal lands”—the buffer zones that keep deserts and treeless mountains from spreading to forests and fertile lands—was stressed at a preparatory meeting for the U.N. Conference on the Human Environment which is to be held next year in Stockholm. In a paper presented to the U.N. Intergovernmental Working Group on Soils, Thane Riney, an FAO ecologist, urged the importance of making regional surveys to locate marginal lands and taking action to deal with them.

Some marginal lands, such as scrub, brush or forests around deserts, begin to deteriorate slowly, but reach a point at which an ecological trigger is suddenly touched off. At this point they rapidly turn barren. Erosion, flash floods and dust bowls can appear and spread over vast areas within a few years time. What is needed, he said, is to locate these areas or take action to stop the down-grading of the land before it reaches the “trigger” point. “Since much of the marginal land is in developing countries, this should be a major international program undertaken by the United Nations family”, Mr. Riney said. (FAO Press Release, Rome, 24 June 1971.).

World Rice Situation

One man's rice is another man's empty husk. Improved farming techniques, irrigation and the new strains of high yielding rice have postponed threats of large scale famine in the rice eating areas

of Asia. But traditional exporters, depending heavily on rice as a source of foreign exchange, like Thailand and Burma, have been badly affected by what is now a buyer's market. Prices which have fallen by 15 to 20 percent over the past 12 months, are only two-thirds of what they used to be in the late 1950's, and the problem looks like a long term one. The main importing countries are moving towards self-sufficiency and some of them could become net exporters within the next five years.

As a result, last year's world crop reached a record 300 million tons. Over 50 percent is in China and India alone and the amount actually traded is only 6 million tons, which makes the world market even more susceptible to price fluctuations. The Philippines is no longer a significant importer. Indonesia and Malaysia substantially reduced their dependence on outside sources (Malaya could be self-sufficient if its people did not prefer Thai rice). India and Ceylon hope to do without imports by 1975. India, as it happens, has not benefited much from the new varieties, partly because of its climate and partly

because rice is grown by small farmers who are not easy to convert to new methods.

The main exporters, apart from Thailand and Burma, are Japan, Italy and the United States, for which the trade is either marginal or subsidized. Japan's farmers get prices three times above world market rates, and as a result stocks have reached eight million tons and could be nearer 12 million by the end of the year. Although they could cut their rice exports without economic pain—and the United States has already done so—there are still local political problems, and consumers in Europe, at least, tend to prefer the long grain rice which Italy and the United States produce.

In the short term, the market could be partly supported by the appalling problems of East Pakistan, which normally needs to import 1.8 million tons a year. If United Nations relief teams on both sides of the border succeed in acquiring and distributing the extra rice now needed, imports should double. (The Economist, London, 24-30 July 1971).

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Cooperation in Canada. J. M. Sullivan, Economics Branch, Ottawa, Sept., 1971. 24p. Bilingual. Pub. No. 71/11.

Machinery Costs on Prairie Wheat Farms in Central Saskatchewan. L. M. Johnson. Prairie Regional Office, Economics Branch, Canada Department of Agriculture, Torwest Tower, Regina, Saskatchewan. June, 1971. Pub. No. 71/10.

Prairie Regional Studies in Economic Geography—No. 6 The Killarney Region of Manitoba. J. W. Channon, D. Zasada, K. Morison. Ottawa. May, 1971. Pub. No. 71/7.

Disease Assessment with 1R-Color. Dr. V. R. Wallen and L. E. Philpotts, in *Photogrammetric Engineering*, May, 1971. pp. 443-446. Reprints are available from the Economics Branch.

CANADA DEPARTMENT OF AGRICULTURE PUBLICATIONS

*Available from Information Division, CDA
Ottawa, Canada. K1A 0C5*

Rapeseed Marketing. A description and evaluation of alternative systems. A report from the Rapeseed Marketing Committee appointed by the Hon. Otto E. Lang, Minister responsible for the Canadian Wheat Board. Ottawa. 1971. 126p. Tables, charts, Cat. No. A95-2/1971. Price \$2.

Contents: Marketing Challenge; Market prospects for Canadian Rapeseed; Essential Marketing Operations; Expectations of any System. Open Market System: system in theory; United States comparisons; evaluation. Open market system-voluntary pooling; compulsory board systems; Canadian Wheat Board; Canadian Wheat Board and rapeseed marketing; producer controlled rapeseed marketing agency.

A Report to Producers on the 1970-71 Crop Year from the Canadian Wheat Board. CWB, 423 Main Street, Winnipeg 2, Canada. 1971. 6p. This report should keep you up-to-date on the highlights of the crop year. It includes an outlook section for the 1971-72 crop year.

Farm Credit Corporation—Annual Report 1970-71. Ottawa, 1971. 31p. Illus. tables, charts. Bilingual Cat. No. A 96-1/1971. Free.

Your Food Dollar. Ottawa, revised, 1971. 18p. Illus., tables, graphs. Pub. No. 1354. Free. Why do food prices keep rising? What do you pay for when you buy food? This publication gives some of the answers, using the latest statistics. It also suggests

ways of getting value for your food dollars, while providing good nutrition for your family. The Section on "Food Prices and Farmers' Returns" is particularly enlightening.

Historical Series—Swift Current Research Station. 1920-70. J. B. Campbell. Ottawa 1971. 79p. Illus. Cat. No. A54-2/6. Free.

Contents: Presettlement era; Experimental Farm Services; Establishing an Experimental Station in the dry zone; Experiments in the 1920's; Early PFRA years; Second World War and the Swift Current Research Station; Post-war interests; Agricultural engineering; Animal and poultry science; Plant science; Field husbandry; Soil science; Administration; Other interests after 1970.

GOVERNMENT OF CANADA PUBLICATIONS

Available from Information Canada, 171 Slater Street, Ottawa. K1A 0S9.

An Institute for Research on Public Policy. Ronald S. Ritchie. Ottawa. 1971. English text. 95p. Bilingual. Cat. No. CP32-13. Price \$2.50. In recent years many have sought the establishment of some facility for thorough-going assessments and re-appraisal of the policies espoused by Canadians and their governments.

The establishment of a Canadian institute, like the Brookings Institute in the United States or the Futuribles in France, appeared vital, since we must be better prepared for the future. All levels of governments need an institution to which one can go for the evaluation of the long-run problems facing our society. It was with this in mind that Mr. Ronald Ritchie, former Executive Director of the Royal Commission on Government Organisation (Glassco Commission), was appointed to study the feasibility of setting up such an institute in Canada. He submitted his report to the Prime Minister at the end of 1969. This report has now been published and is available from Information Canada.

Dynamic Policy Research. Agricultural Economics Research Council of Canada. Ottawa. 1971. Binder. This reference book on the Agricultural Economics Council is divided in sections each answering questions like: What is the Council? Who is the Council? But what have you done? etc. . .

Personal Consumer Expenditures in Canada, 1926-1975—Part 3. Thomas T. Schweitzer. Prepared for the Economic Council of Canada. Ottawa. 1971. (Staff Studies No. 26, Part 3.) 67p. Tables, charts. Cat. No. EC 22-1/26-3. Price \$1.50.

Environmental Management. J. W. MacNeil. Published by the Privy Council. Ottawa. 1971. 191p. Tables, graphs, map folded in a pocket. Cat. No. CP 32-12/1971. Price \$2.25 (Also available in French: *Gestion du milieu*).

Science Policy for Canada. Report of the Senate Special Committee on Science Policy. Vol I: Critical Review: Past and present. Ottawa. 1971. 327p. Tables, charts, Cat. No. YC 282/1-01. Price \$3.50. Also available in French. This is the report of the Senate Special Committee on Science Policy during the first and second sessions of the 28th parliament. Chairman: The Hon. Maurice Lamontagne. The report deals extensively with Canada's first attempt to build a science policy and its failure in the 1940's. For the next decade, the country is described as having been without a science policy, but a second attempt to build one followed in the 1960's. The report ends on a description of the need in Canada for an overall science policy.

STATISTICS CANADA PUBLICATIONS

(formerly DBS)

Available from the Publications Distribution Unit, Ottawa 3, Canada

Agricultural Implement Industry: 1969. Annual Census of Manufactures. Manufacturing and primary Industries Division. Ottawa. 1971. 7p. Tables. Cat. No. 42-202/1969. Price 50¢ per copy. Also available in French.

Breakfast Cereal Manufacturers: 1969. Annual Census of Manufactures. Manufacturing and Primary Industries Division. Ottawa. 1971. 6p. Tables. Cat. No. 32-204/1969. Price 50¢ per copy. Also available in French.

Fruit and Vegetables Preparations. (Jam, Jellies and Marmalades). Ottawa. June, 1971. Cat. No. 32-017. Price 25¢ per copy, \$1.00 per year.

Grain Trade of Canada 1969-70. Prepared jointly by the Crops Section, Agriculture Division, Statistics Division, and the Canadian Grain Commission. Ottawa. 1971. 93p. Tables. Cat. No. 22-201/1970. Price \$1.00.

Production of Poultry and Eggs: 1970. Prepared in the Agriculture Division. Ottawa. 1971. 28p. Tables, graphs, Cat. No. 23-202/1970. Price 50¢ per copy. Also available in French.

Statistics on Low Income in Canada: 1967. Prepared by the Consumer Finance Research Staff. Ottawa. 1971. 49p. Tables, Cat. No. 13-536. Price 75¢ per copy. Also available in French.

FAO, OECD AND EEC PUBLICATIONS

Available from Information Canada

Review of the Agricultural Situation in Europe at the end of 1970. Volume II: Dairy Products and Eggs. Prepared by the EEC/FAO Agriculture Division. Geneva, EEC, 1971. 130p. Tables, charts. Cat. No. GE 71-8360. Volume I: General Survey, Grains, Livestocks and Meats, 166p. and Volume II, Price \$3.60.

National Grain Policies—Supplement 1970. Prepared in the Grain Section, FAO, Rome. 1970. 102p. Tables, Cat. No. PC 1A9212/2.71/E/1/2800. Price \$3.00.

Survey of Export Market for Sorghum. FAO, Rome. 1971. Commodity Bulletin Series No. 49, 40p. Cat. No. PS/B2046/3.71/E/1/3500. Price \$1.50.

Trade Yearbook. Vol. 24, Statistics Division, FAO, Rome. 1971. 575p. English-French-Spanish. Cat. No. BO534/6.71/TR1/1/6200. Price \$7.00 (U.S.)

World Grain Trade Statistics—1969-70. Exports by source and destination. Prepared in the Basic Foodstuffs Service, Commodities and Trade Division. FAO, Rome. 1971. 77p. English-French-Spanish. Cat. No. B4320/5.71/TR1/1/4500. Price \$2.00 (U.S.) The book is divided into five parts, namely: World Trade in Grains; Grain Exports by Source and Destination; Trade in Grains of the Centrally Planned Countries; Trade in Grains by Regions and Selected Countries; and of special-interest, Recent International Grain Trade Contracts, based on official and unofficial sources.

OTHER PUBLICATIONS

Economics: Applications to agriculture and agribusiness. E. P. Roy. Danville, Illinois, Interstate Publ. 1971. 445p.

Economic Research of Interest for Agriculture 1966-69. (List of publications). Grannini Foundation of Agricultural Economics and Department of Agricultural Economics, University of California. Dec., 1970.

Farm Business Summary 1970. Prepared by T. J. Yudai, Economic Report No. 15 Economics and Publications Branch, Manitoba Department of Agriculture. Winnipeg. July, 1971. 25p. Tables, graphs.

Marketing Models: Behavioral Science Applications. R. L. Day. Scranton, Pennsylvania. Intext, 1971. 556p.

Marketing Models: Quantitative Applications. R. L. Day, Scranton, Pennsylvania. Intext, 1971, 693p.

British Columbia Department of Agriculture—65th Annual Report. Victoria, B.C. 1971, 26p.

Coup d'oeil sur l'agriculture du Québec et son évolution. Québec, Ministère de l'Agriculture et de la Colonisation. 1971. 49p. Tables.

Institutions in Agricultural Development. Edited by Melvin G. Blase. Ames, Iowa. Iowa State University

Press, 1971. Price \$5.95 (U.S.) A comprehensive overview of those institutions strategic to agricultural development and proposals for helping these organizations.

Farm Tenure in Saskatchewan — an evaluation of present situation and future prospects. Jacob A. Brown and Robert J. Bens. ARDA Project No. 27072. Available from Department of Agricultural Economics, University of Saskatchewan, Saskatoon, Canada. June, 1971.

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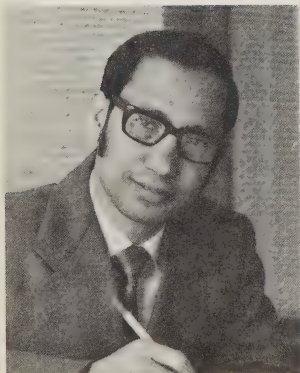
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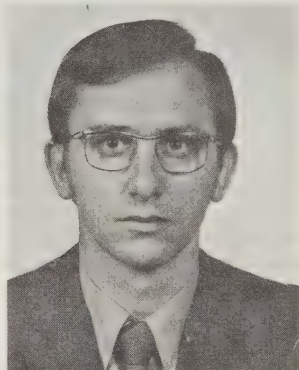
CANADIAN FARM ECONOMICS

ESTIMATING THE EFFECTS OF OPERATION LIFT ON 1970 PRAIRIE LAND UTILIZATION



R. K. Sahi

This research article estimates that 'Operation Lift' reduced wheat acreage in 1970 by ten million acres and increased summerfallow by over six million acres.



W. J. Craddock

Considerable debate has taken place in the past year on the success of the LIFT program (Lower Inventory for Tomorrow) in affecting the pattern of prairie land utilization in 1970. Wheat acreage in the prairies declined from 24.4 million in 1969 to 12.0 million in 1970, an apparent result of the LIFT program. However, it is maintained by some that wheat acreage would have been reduced to about 14 or 15 million in the absence of the LIFT program and, therefore, it should not be credited with having had any significant effect in reducing wheat acreage. The purpose of this study is to quantitatively estimate the impact of Operation LIFT on the 1970 acreage

of the principal crops in the prairies. No attempt has been made in this study to examine the effects of the program on the land use patterns on different types and sizes of farms, on the income of farm operators, on the prairie economy, on world prices of wheat and feed grains, or on future production.

Purpose of the LIFT Program

Increased wheat acreage and exceptionally good yields were characteristics of the prairie grain industry in the latter half of the 1960's. At first, the additional production was exported, but as production in importing countries increased, our wheat exports sharply declined. This resulted in large stocks on farms and in commercial channels in late 1969—850 million bushels by July 31. It was also expected that stocks at the end of crop year 1969-70 would exceed a record one million bushels, and more than half of this would be on prairie farms. This mounting inventory was equivalent to about

R. K. Sahi is an economist with the Research Division of the Canada Department of Agriculture's Economics Branch and W. J. Craddock is an Associate Professor in the Department of Agricultural Economics, University of Manitoba, Winnipeg. This article is based on Mr. Sahi's thesis, to be submitted to the University of Manitoba in partial fulfillment of the requirements for a Ph.D. degree. The project was supported by an Operating Grant from the Canada Department of Agriculture.

two years normal disappearance.

The large stocks contributed to depressed prices for wheat and feed grains on world and domestic markets. The domestic grain handling and storage facilities were clogged and unable to operate efficiently. Also, the lower wheat marketings resulted in acute cash shortages among prairie grain producers. This problem was particularly severe in Saskatchewan because of farmers' great reliance on wheat compared to other crops or livestock.

In the absence of any explicit government programs to influence the 1970 acreage of wheat, it is likely that farmers would have undertaken some reduction by switching to crops such as feed grains and oilseeds. However, the stock position for feed grains was very large and it is doubtful that significant switches to these crops would have taken place. In the winter of 1969-70, it was expected that a major increase in rapeseed and flaxseed production would have resulted in unreasonably low prices and large carryovers by the end of the 1970-71 crop year.

Under these circumstances, the Honourable Otto E. Lang, Minister responsible for the Canadian Wheat Board, presented to the House of Commons on February 27, 1970, the program known as Lower Inventory for Tomorrow. The stated purpose of this program was to reduce wheat acreage and to encourage farmers to hold this land out of production of any crop in 1970.

The following statement was made by the Minister.

"Producers in the Wheat Board designated region who reduce wheat acreage below 1969 levels and increase summerfallow or perennial forage by the same amount will receive federal compensation payments of \$6.00 per acre for additions to summerfallow or \$10.00 per acre for additions to perennial forage acreage" (1, p. 3).

The program was to drastically cut wheat acreage, and at the same time to discourage a wholesale switch to other crops.

Methods of Analysis

In this study, a recursive linear programming model (a method for estimating present and future behaviour of a group of producers) was developed to predict prairie land use patterns. In terms of solution procedures, recursive programming is the same as linear programming. Both are mathematical techniques which can be employed to optimize a linear

objective function subject to linear constraints (see note 2). In research relating to agricultural production, maximization of net farm income generated by the enterprises included in a model is often the objective function. Typically, the restraints are the amounts of available resources and marketing quotas.

Recursive programming is capable of predicting the actual behavior of farm firms; whereas, linear programming is designed to estimate an optimum behavior. This feature of the recursive model is acquired through the introduction of flexibility restraints which represent the maximum and minimum limits which farmers, in aggregate, change acreage of a crop from one year to the next (3). Limited changes in crop acreages between years may result from farmers' inability or unwillingness to make profitable adjustments due to insufficient knowledge, risk and uncertainty, personal preferences and goals other than maximizing net farm income.

In this study, maximum and minimum flexibility restraints were used for each crop. The restraints were calculated using upper and lower flexibility coefficients which are the maximum or minimum proportions by which farmers increase or decrease, respectively, acreage of a crop from one year to the next.

Multiple regression analysis of time series data (a statistical technique used here to determine the causes of year to year changes in crop acreages) was employed to estimate the flexibility coefficients. In order to develop the regression model, it was hypothesized that the flexibility coefficients of a crop depend upon its price and the prices of competitive crops, acreage in the previous year, year-end stocks and exports of the crop in question and competitive crops, amount of rainfall in the months of April and May and a time trend to account for technological change. The regression equations were fitted to annual data from 1953 through 1967 (4,5).

The estimated coefficients were utilized to calculate flexibility restraints. The upper flexibility restraint for a crop was calculated by multiplying the acreage of that crop in the preceding year by one plus the upper flexibility coefficient. Similarly, the lower flexibility restraint was estimated by multiplying the acreage by one minus the lower flexibility coefficient. Upper and lower flexibility restraints were estimated in this manner for each crop included in the model. Similar restraints were also estimated for stubble

land.

Other behavioral restraints utilized in this study were absolute maximum and minimum acreage constraints for each crop. These restraints were based on the actual maximum and minimum acreages of the crop during the period 1953-1967. The rationale for introducing such constraints is that farmers in a region have maintained a certain minimum number of acres of a crop (and, therefore, a certain maximum acreage of other crops) for crop rotation purposes and for growing livestock feed.

Only two resource restraints were included in the model: the total improved land for the current year, and the summerfallow acreage of the preceding year. Labor and capital restraints were not used because it is unlikely that they affect changes in crop acreage from one year to the next.

Quota restraints were used in this study to account for Canadian Wheat Board restrictions on the sales of crops. Three types of quota restraints were utilized to represent types of quotas in effect during the period of analysis: (1) unit quota, (2) specified acreage quota, and (3) supplementary quotas.

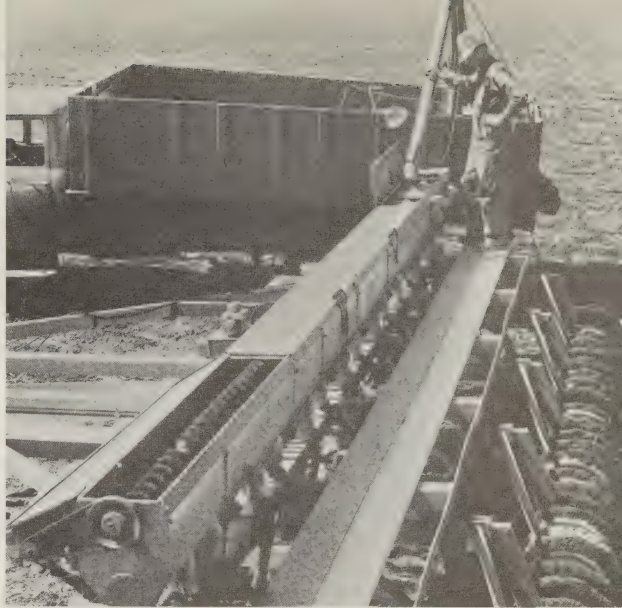
The six major crops of the prairies were included in the model. These crops are wheat, oats, barley, rye, flaxseed and rapeseed. In addition, summerfallow acreage was included as an alternative land use. Two producing activities were employed for each crop, one for crops seeded on summerfallow and one for crops grown on stubble.

Four selling alternatives were considered for each of wheat, oats, barley and rye. The associated activities in the programming model are:

- (1) selling through the unit quota;
- (2) specified acreage quota sales;
- (3) selling through supplementary quotas; and
- (4) non-quota sales and/or the discounted values of production not sold.

Sales of flaxseed and rapeseed have been restricted in the beginning of each crop year. But usually toward the end of the year, these crops have, in effect, had open quotas. Therefore, only one selling activity was employed in the model for each of these two crops (i.e. an activity which permitted sales without quota restrictions).

A different recursive programming model was developed for each province. These models were then used to estimate the provincial land utilization patterns. The prairie results were obtained by total-



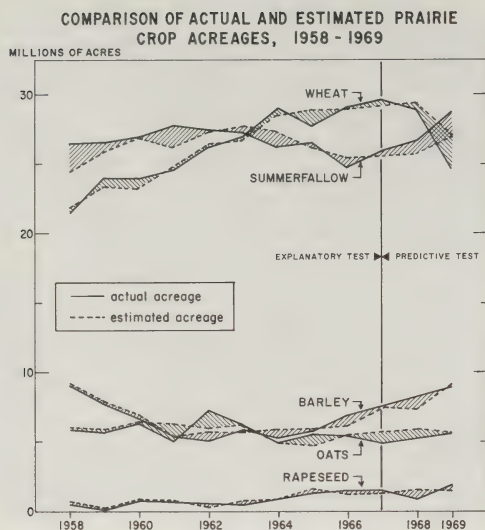
ling the provincial estimates. In order to test the explanatory power of the model, provincial recursive programs were solved for each individual year from 1958 through 1967. Once the model was finalized, its predictive power was established by estimating acreages for 1968 and 1969.

EVALUATION OF THE MODEL

The Explanatory Test

This test was intended to determine whether the model was capable of explaining farmers' land utilization patterns during the period 1958 through 1967. Estimated acreages of five of the crops are compared with actual acreages in Figure 1. The results of the explanatory test are also illustrated by years for all crops and summerfallow in Table 1, in terms of the percentage deviation of estimated from actual acreage.

The recursive programming models explained the prairie land utilization pattern with some degree of accuracy. The over-all weighted average of deviations for 1958 through 1967 for all land use was about four percent. For summerfallow and wheat acreages, the weighted averages of deviations for 1958 through 1967 were less than three percent. The maximum average error was about 18 percent—for flaxseed. In any one year, the average error for all land use did not exceed six percent. On the basis of a subjective evaluation of these results, it was concluded that the recursive programming model had satisfactory explanatory power.



The Predictive Test

This test involved a forward analysis. The model, which was developed on the basis of 1953 through 1967 data and tested over 1958-1967, was used to make predictions for 1968 and 1969. The predicted acreages were again compared with actual observations (7). The results for five crops are illustrated in Figure 1. The percentage deviations of predicted from actual acreages are given in Table 2.

The two-year weighted average of the deviations for wheat is 6.64 percent. Rapeseed had the largest error—approximately 34 percent. The average deviation for all crops was 5.98 percent in 1968 and

about nine percent in 1969. In general, the errors in the predicted acreages were small, considering the abnormal situation existing in prairie agriculture during this period.

IMPACT OF THE LIFT PROGRAM ON PRAIRIE LAND UTILIZATION

The recursive programming model was used to predict the 1970 crop acreages in the absence of the LIFT program. A comparison of predicted and actual acreages would show the effectiveness of the program in determining the 1970 prairie land utilization pattern.

In estimating the 1970 acreages, certain changes were made in the basic construction of the model. First, the lower flexibility restraints and absolute minimum acreage constraints for wheat were eliminated in order to recognize the particularly abnormal conditions in 1970. Secondly, for flaxseed and rapeseed, only the greater of the upper flexibility restraints and absolute maximum acreage constraint was used because acreages of these crops have shown upward trends in recent years, and have frequently exceeded their absolute maximum acreage constraints (defined on the basis of 1953-1967 data).

After making these modifications to the model, the 1970 land utilization pattern was predicted. Results are presented in Table 3. Actual and predicted acreages are also illustrated in Figure 2. Wheat acreage shows a decline from an actual 24.4 million in 1969 to a predicted 22.0 million in 1970. However, the actual acreage was 12.0 million, substantially less than the acreage predicted by the model. This study attributes the difference between

TABLE 1—DEVIATIONS OF ESTIMATED FROM ACTUAL PRAIRIE CROP ACREAGES (SIGN IGNORED), 1958-1967

Crop Year	Wheat	Oats	Barley	Rye	Flax	Rapeseed	Summer-fallow	Weighted Average of Deviations
(percent)								
1958.....	1.99	4.15	2.79	1.71	33.16	33.65	6.76	5.66
1959.....	2.32	5.56	4.37	5.24	32.25	48.75	2.70	4.06
1960.....	3.01	3.96	6.60	7.19	4.04	4.95	0.16	2.41
1961.....	0.71	25.40	2.16	5.96	4.64	18.79	5.48	5.10
1962.....	1.10	16.96	13.51	9.95	58.76	17.46	0.63	4.84
1963.....	0.71	1.00	4.01	6.58	3.86	37.16	1.63	1.76
1964.....	1.79	0.03	12.73	7.16	13.52	12.48	3.79	3.76
1965.....	4.39	15.46	4.83	16.84	19.90	10.88	1.25	4.88
1966.....	1.92	4.17	9.60	16.88	0.83	16.04	2.32	3.42
1967.....	0.53	12.79	2.18	11.10	10.53	16.97	1.20	2.43
Wt. Av. of Deviations.....	1.83	8.92	5.88	9.49	17.74	17.61	2.59	3.83

COMPARISON OF CROP ACREAGES: 1969 ACTUAL, 1970 PREDICTED AND 1970 ACTUAL

MILLIONS OF ACRES

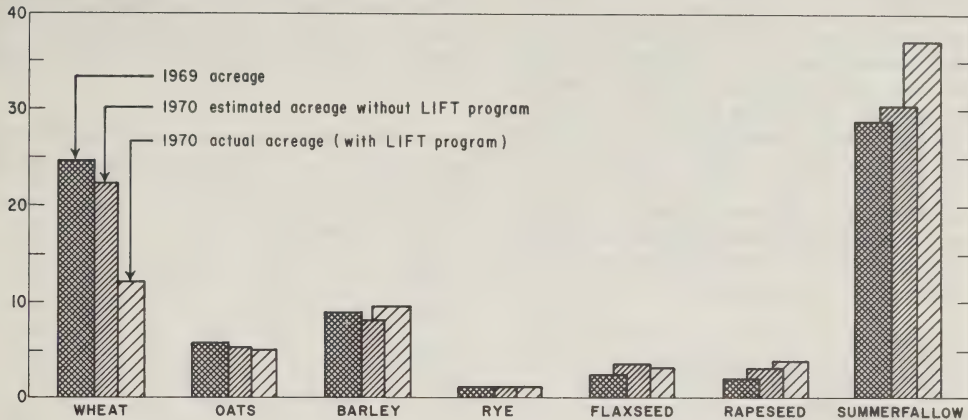


FIGURE 2

the predicted 22.0 million acres and the actual 12.0 million acres in 1970 (45 percent) to the LIFT program. This would indicate that the program was highly effective in reducing wheat acreage. Since differences between actual and predicted acreages of other crops, except rapeseed, were not particularly large (less than ten percent), it appears that the program did not have any major impact on these crops.

In the case of rapeseed, even though the actual acreage was significantly different (20 percent) from the predicted acreage, the LIFT program might not have caused this difference. Rather, it might be explained by the insensitivity of the model to the dynamic situation surrounding rapeseed production. As shown earlier, the model was not entirely satis-

factory in estimating rapeseed acreage. In the explanatory test, the average error in the rapeseed estimate was about 18 percent (Table 1). However, this large average error was in part influenced by the very large errors in 1958 and 1959 when this crop was relatively new to the prairies and occupied a relatively minor acreage. Under the predictive test, the error for rapeseed was about 54 percent in 1968 and 23 percent in 1969. The model's weak explanatory and predictive power for rapeseed would further substantiate the unreliability of the estimate for this crop in 1970.

It was estimated that without the LIFT program, summerfallow acreage would have increased from 28.8 million in 1969 to 30.3 million in 1970. However, the actual acreage was 36.9 million acres. On the basis of these estimates, it could be concluded that the program resulted in an additional 6.6 million acres of summerfallow.

TABLE 2—DEVIATIONS OF PREDICTED FROM ACTUAL PRAIRIE CROP ACREAGES (SIGN IGNORED), 1968-1969

Crop	1968	1969	Weighted Average of Deviations
			percent
Wheat.....	3.00	10.95	6.64
Oats.....	13.00	13.51	13.36
Barley.....	12.16	1.71	6.73
Rye.....	4.37	24.01	15.79
Flaxseed.....	10.72	24.56	19.26
Rapeseed.....	53.99	22.80	33.51
Summerfallow.....	3.72	6.07	4.94
Weighted Average of Deviations.....	5.98	9.09	7.54

TABLE 3—ESTIMATED AND ACTUAL LAND UTILIZATION PATTERN IN THE PRAIRIES, 1970

Crops	1969 Actual Acreage	1970 Estimated Acreage	1970 Actual Acreage
(thousand acres)			
Wheat.....	24,400	21,954	12,000
Oats.....	5,630	5,342	5,390
Barley.....	9,000	8,276	9,500
Rye.....	859	896	944
Flaxseed.....	2,420	3,505	3,350
Rapeseed.....	2,012	3,289	3,950
Summerfallow...	28,800	30,335	36,900

The LIFT Program, Wheat Production and Stocks

The yield of wheat in 1970 was 26.0 bushels per acre. The total production of spring wheat resulting from 12.0 million acres was 331 million bushels. If the predicted acreage of 22.0 million had been seeded and average yield of 26.0 bushels per acre had been obtained (8), the total production of wheat would have been 70 million bushels, 72 percent above the actual 1970 production. Carryover stocks of wheat at the end of the 1970-71 crop year would have been 240 million bushels greater in the absence of the LIFT program.

SUMMARY AND CONCLUSIONS

The purpose of this study was to estimate the impact of Operation LIFT on 1970 prairie land utilization. A recursive programming model was utilized to predict aggregate crop acreage that would have been seeded in 1970 without LIFT. The comparison of predicted to actual acreages would show the impact of the program on the prairie land utilization pattern.

Although, among individual farmers, the response to the LIFT program might have varied widely, this study suggests that in aggregate the program was effective in reducing wheat acreage from a predicted 22.0 million to actual 12.0 million (45 percent) and in increasing summerfallow acreage from 30.3 million to 36.9 million acres in 1970. It appears that the program did not have any major impact on acreage of other crops. The study further indicates that the absence of the LIFT program would have caused 240 million bushels of increase in the wheat stocks at the end of the crop year 1970-71.

Thus, due to the program, the exceptionally large stocks did not rise further in 1970-71 and have been declining ever since. However, the study only considered aggregate land use in 1970 and did not comment in a comprehensive way on the total impact of the program on prairie agriculture.

ACKNOWLEDGMENTS

The authors are appreciative of constructive comments made by Mr. J. S. Carmichael, Mr. I. F. Furniss, Mr. S. W. Garland, Dr. V. Gilchrist and Dr. G. A. Hiscocks of Canada Department of Agriculture's Economics Branch. These reviewers are, however, not responsible for any errors or omissions.

NOTES AND REFERENCES

1. The Honourable O. E. Lang "Statement to the House of Commons on Lower Inventory for Tomorrow: Wheat Stock Reduction Program", February 27, 1970.

2. A linear programming model consisting of m constraints and n activities can be expressed algebraically as follows:

$$\text{Optimize } Z = \sum_{j=1}^n C_j X_j$$

$$\text{Subject to: } \sum_{j=1}^n a_{ij} X_j (\leq, =, \geq) b_i \quad (i=1, \dots, m)$$

$$\text{and } X_j \geq 0 \quad (j=1, \dots, n)$$

where:

Z = objective function value to be optimized (maximized in this study)

X_j = level of the j th activity or enterprise,

C_j = price or cost per unit of the j th activity,

a_{ij} = amount of i th restraint required per unit of the j th activity, and

b_i = amount of the i th restraint available.

The solution procedure finds values for the X_j 's which optimize Z and do not violate the restraint equations. A detailed description of linear programming can be found in the book *Linear Programming Methods*, by Earl O. Heady and Wilfred Candler (Iowa State University Press), 1964.

3. Maximum and minimum flexibility restraints of a crop are expressed algebraically as follows:

$$X_t \leq (1 + \bar{B}_t) X_{t-1} \quad \text{Maximum restraint}$$

$$X_t \geq (1 - \underline{B}_t) X_{t-1} \quad \text{Minimum restraint}$$

where:

X_t = solution acreage of a crop in the t th year

X_{t-1} = actual or solution acreage of a crop in the $t-1$ year, and

$\bar{B}_t, \underline{B}_t$ = maximum allowable proportionate increase and decrease, respectively, of current year acreage from that of the preceding year. These are known as upper and lower flexibility coefficients.

4. For estimating upper and lower flexibility coefficients, observations during 1953 through 1967 were separated into two groups on the basis of positive or negative changes in year-to-year acreage of a crop. A separate equation was then fitted to each group. The separation of observations was made in

view of an assumption that the upper and lower flexibility coefficients are not equal. While estimating the coefficients for a few crops, it was necessary to transform some variables in such a way that price ratios were used in the place of individual prices. Similarly, stock and export ratios were also used in these equations.

5. The flexibility coefficients of this study, which were estimated through multiple regression analysis, vary from year-to-year depending upon the levels of the explanatory variables such as prices, exports, rainfall, etc. In most previous recursive programming studies (6), flexibility coefficients were estimated such that they were immune to year-to-year changes in economic and non-economic conditions. In these studies, the same pairs of flexibility coefficients were used in the analysis for each year. This is likely to be an unreasonable approach and would reduce the reliability of the results.

6. R. H. Day, *Recursive Programming and Production Response*; (Amsterdam: North-Holland Publishing Company, 1963); J. M. Henderson, The Utilization of Agricultural Land: A Theoretical and Empirical Inquiry, in *Review of Economics and Statistics*, 41: 242-529; and W. N. Schaller, and G. W. Dean, *Predicting Regional Crop Production*, Tech. Bull. 1329, U.S.D.A.

7. While examining the predictive power of the model, it should be remembered that the crop years 1968-69 and 1969-70 were abnormal in many respects for prairie agriculture.

8. In reality, the average yield of wheat might have been somewhat different if 22.0 million acres had been seeded in 1970. The difference in yield would have depended on where the additional acreage was seeded and the relative acreages seeded on summer-fallow and stubble.

THE WORLD FOOD PROGRAM

AID FOR DEVELOPMENT



*Frank Shefrin**

Although 70 percent of the world's people live in less-developed areas their share of the world's income is just over 20 percent. In fact, per capita annual income early in the last decade was less than \$100 in most countries in the Far East and Africa, from \$100 to \$200 in most countries of the Near East, and from \$100 to \$250 in most countries of Latin America. The Far East with about half of the total population has only 12 percent of the world income. Africa with seven percent of the population has two percent of the income. Latin America has almost seven percent of the population but only 4.7 percent of the total income. North America with not quite seven percent of the population has almost 40 percent of the income, while Europe with 22 percent, has almost 38 percent of the income.

*Mr. Frank Shefrin is the Director of the International Liaison Service, Canada Department of Agriculture and Chairman of the Canadian Interdepartmental WFP Committee. This article is an enlargement of a paper prepared for delivery to the General Council Meeting of the Canada Grains Council, September 27-28, 1971.

"Food aid, whether bilateral or multilateral is a unique form of assistance, differing from capital or technical assistance" . . . Multilateral food aid as provided by the WFP . . . "often acts as a catalyst and mobilizes the resources of beneficiary countries themselves".

"Total food aid has contributed about one-third of the total economic aid since the end of World War II".

"Since 1966, Canada has been the second (after the U.S.A.) largest contributor to the WFP".

More than half of the world's people live in the Far East, but have only about a quarter of the world's total food supplies, made up of only 19 percent of world production of foods of animal origin and 44 percent of the total production of crop and vegetable foods. This is in striking contrast with Europe, Oceania and North America which, with about a third of the world's population, produce almost 60 percent of the total world's food supplies, made up of about 70 percent of the total animal food supplies and about 40 percent of the total crop and vegetable food supplies.

The agricultural performance of developing countries is not very comforting, particularly in relation to population growth. From 1960 to 1970, the trend of per capita food production in the developing countries of both the Far East and the Near East was static, showed a barely perceptible rise in Latin America, and fell slightly in the developing countries of Africa. Since population growth accelerated only

TABLE 1—COMMODITIES, SERVICES AND CASH PLEDGED TO THE WFP, 1963-1972

	Commodities	Services	Cash	Total Pledges
thousand U.S. dollars				
<i>Announced Pledges</i>				
1. 1963-65.....	59,240	6,375	18,980	84,595
2. 1966-68.....	155,020	33,438	35,109	223,567
3. 1969-70.....	198,975	27,000	35,064	261,039
4. 1971-72.....	156,393	37,000	30,282	223,675
TOTAL.....	569,628	103,813	119,435	792,876
<i>Actually Available</i>				
1. 1963-65.....	59,240	6,375	18,980	84,595
2. 1966-68.....	127,048	23,708	35,109	185,866
3. 1969-70.....	198,975	27,000	35,064	261,039
4. 1971-72.....	142,787	31,077	30,282	204,145
TOTAL.....	528,050	88,160	119,435	735,645

marginally during the sixties (between 1960-65 and 1965-69 it rose from 2.4 to 2.5 percent a year in Africa and the Far East, from 2.7 to 2.8 percent a year in the Near East, and remained unchanged at 2.9 percent in Latin America) the widespread stagnancy in per capita output reflects mainly the failure of food production in these regions to accelerate.

The current situation is only slightly more encouraging. In 1970, per capita food production in all developing countries combined exceeded that of 1967—the first year that may be considered “normal” after widespread bad harvests in 1965 and 1966—by some 2.5 percent; but all this improvement reflects the gains achieved in the Far East where per capita production increased by seven percent. In Latin America there was no increase, while in both Africa and the Near East the level has actually fallen in the last three years.

During the last decade, there has been increasing awareness of the extent and implications of the problem of protein-calorie nutrition. Most of the nations in which protein-calorie malnutrition is rampant are also beset with other developmental problems which governments consider of much higher priority than nutrition.

The U.N. family of agencies is actively engaged in trying to solve the problems of development and nutrition. Where immediate solutions are not available every effort is made by the agencies to mitigate the urgent requirements. The World Food Program is one of these agencies.

The World Food Program is a joint operation of the United Nations and the Food and Agriculture

Organization. It began operations in 1963, and in less than nine years nearly 500 development projects have been approved in 85 countries at a total cost of \$1.1 billion, in food, feed and transportation.

THE OBJECTIVE OF THE WFP

The goal of WFP, in common with the other international agencies concerned, is to assist in the development and nutritional progress of developing countries to the stage where they will be able to produce, or purchase on a normal commercial basis, the food which their people require.

The General Regulations state that WFP “shall, on request, provide aid for: (a) meeting emergency food needs and emergencies inherent in chronic malnutrition (this could include the establishment of food reserves); (b) implementing projects, using food as an aid to economic and social development, particularly when related to pre-school and school feeding, increasing agricultural productivity, labour-intensive projects and rural welfare”.¹

Food aid provided by the World Food Program has a complementary character. It is an additional source of aid which often acts as a catalyst and mobilizes the resources of beneficiary countries themselves. The WFP is not a charitable organization. Confirmation of its complementary role in the recipient countries, is that food aid is tied in with some \$3.8 billion of additional resources for the implementation of such projects.

Food aid whether bilateral (which makes up the bulk of food aid) or multilateral is a unique form of assistance, differing from capital or technical

¹WFP General Regulations, Part B, paragraph 5.

assistance. Food aid mitigates the paradoxical problem of superabundance and want existing side by side. It is an additional resource made available for developing countries because of factors that are only partly related to the motivation to provide aid. Countries possessing food supplies which cannot be used in any foreseeable future at home, nor exported commercially, do not wish to waste these supplies as long as there are undernourished people in the world. The food is provided for consumption to developing countries, on concessional terms ranging from low cost credits to grants.

Total food aid, bilateral and multilateral, has contributed not only to economic development but also to reducing the lag of social development. It has contributed around one third of the total economic aid since the end of World War II. The total estimate exceeds \$25 billion.

Food aid, however should not be construed as a justification for deliberate production of surpluses. It must be handled carefully and intelligently. It is, also, important to ensure that food aid does not have any harmful effect on the agriculture of developing countries and on normal commercial trade.

To safeguard commercial interests and the markets of exporting countries, FAO Principles of Surplus Disposal¹ are observed by the WFP, and there is consultation with the FAO Consultative Sub-Committee on Surplus Disposal in Washington.

At the same time WFP must, where arrangements for food aid are being proposed, take into account

the recipient country's program for agricultural development, and ensure that food aid supports and complements the development program and food policies of that country.

RESOURCES

It is of interest to note that through voluntary pledges, the resources of WFP have been steadily increasing since it began operations. Besides contributions by individual countries, the World Food Program has been chosen by several nations that are parties to the Food Aid Convention of the International Grains Agreements of 1967 and 1970 as a channel for the discharge of all or part of their responsibilities under the Convention.

By July 31, 1971, the total resources actually available to the Program since its inception, including pledges for the period 1971-72, stood at a total of more than \$736 million (Table 1), of which \$528 million were in commodities and almost \$208 million in cash and services. The signatories to the Food Aid Convention had made available to the Program a further \$41 million worth of food grains.

Some 90 countries have contributed to the WFP. Over the 1963-72 period, about 46 percent of the total or \$336 million have been provided by the U.S.A., and over 13 percent or \$U.S. 96.5 million by Canada of which \$73.8 million were commodities and \$22.7 million was cash. In the pledging period 1971-72 the ten largest donors are U.S.A., Canada, Denmark, Netherlands, Sweden, Federal Republic of Germany, Norway, United Kingdom, Finland and Australia. These ten donors have

¹ Principles of Surplus Disposal

1. The solution to problems of agricultural surplus disposal should be sought, wherever possible, through efforts to increase consumption rather than through measures to restrict supplies.
2. Member governments which have excess stocks of agricultural products should dispose of such products in an orderly manner so as to avoid any undue pressure resulting in sharp falls of prices on world markets particularly when prices of agricultural products are generally low.
3. Where surpluses are disposed of under special terms, there should be an undertaking from both importing and exporting countries that such arrangements will be made without harmful interference with normal patterns of production and international trade.

The Principles governing concessional sales include reference to the use of surpluses in aid of development, for special distribution programs, and for emergency relief. They emphasize the importance of these disposals being absorbed through consumption which would not have taken place in the absence of the transaction on special terms; and recommend consideration in the light of the relative extent of the concessional trade and the degree of importance of trade in the commodity to the economy of the disposing country, of any competing exporter, and of the importing region.

TABLE 2—UTILIZATION OF CEREALS AVAILABLE TO THE WFP DURING THE 1ST, 2ND AND 3RD PLEDGING PERIODS ON JUNE 30, 1971

	1963-65	1966-68	1969-70 ^a
	1st period	2nd period	3rd period
	(metric tons)		
Wheat ^a	171,800	465,220	451,499
Wheat Flour....	40,540	188,053	199,363
Maize.....	148,730	169,909	84,511
Maize Meal....	14,740	51,616	56,326
Sorghum.....	20,980	48,401	43,893
Barley.....	41,480	450	34,300
Oats.....	2,030	12,900	5,663
Rice.....	580	4,020	6,443
TOTAL.....	440,880	940,569	881,998

^a Not including Food Aid Convention Wheat.

^b As at June 30, 1971.

contributed nearly 94 percent of the resources pledged to date for the 1971-72 period.

Food commodities contributed by major donors include cereals and grains, dairy products, vegetable oils, dried fish and canned meats. Other food commodities provided in lesser volume consist of dried beans and peas, canned meats, lentils, dried and canned fruits, tea, coffee, sugar and syrup, jam and such preparations as C.S.M. (corn, soya and skim milk powder) and W.S.B. (wheat, soya blend).

In volume terms the bulk of food aid was in wheat and wheat flour (for details see Table 2). Between January 1963 and the end of June 1971, over one million metric tons of wheat were made available to the WFP and nearly 500,000 metric tons of wheat flour, and 190,000 metric tons of dried skim milk. It is interesting to note that in dollar terms equal amounts of grain and dairy products have been made available to the Program. The EEC was the largest contributor of dairy products.

Disbursements

WFP is now disbursing at a rate of \$150 million in food and feed every year. The magnitude of WFP's operational task is best illustrated by the fact that during 1970 WFP shipped a total of 875,000 tons of food, and that during 1971 it is expected to move even more tonnage. Every month during 1970, the Program used an average of some 160 ships to make an average of 230 separate shipments of various sizes. For the final stage of transport to landlocked countries it uses either rail or road transport, or river or lake vessels.

The bulk of WFP food aid went to North Africa and the Near East. Asia was second followed by Latin America and Africa (Table 3).

TABLE 3—FOOD AND FEED COMMITMENTS FOR PROJECTS BY REGIONS, FROM 1963 TO JUNE 30, 1971

Regions	No. of projects	Food and feed ^a costs
		thousand U.S. dollars
Latin American and Caribbean.	77	122,820
North Africa and Near East....	112	310,253
Africa (South of Sahara).....	136	107,971
Asia.....	127	214,866
Europe.....	39	77,944
TOTAL.....	491	833,854

^a Does not include transportation and other non-commodity costs.

Which Countries Received WFP's Aid?

Many countries have received WFP's Aid (See map) and references will be made only to the major recipients.

The total value of WFP food aid granted to India amounts to about \$85 million and that granted to the United Arab Republic nearly \$90 million. Turkey, Algeria and Tunisia in Northern Africa and Near East, Columbia in Latin America, and Taiwan in Asia are receiving food aid for amounts ranging between \$40 and \$50 million. In Africa, the highest amount of food aid was received by Lesotho (population of 855,000 in 1968) about \$19 million; and the second country, Botswana (pop. 611,000 in 1960), received \$11 million in WFP food aid. In Southern Europe, and the nearby region, Cyprus (pop. 622,000 in 1968) received food aid of over \$11 million; Hungary, Malta and Yugoslavia each received about \$1 million worth of WFP food aid.

DEVELOPMENT PROJECTS

Agricultural Developments

Development projects undertaken by WFP are mainly grouped in four categories, the first of which is agricultural development, absorbing more than 50 percent of its resources. Projects in this category include the use of food as a capital input to promote employment and increase food production. In this category are projects concerned with colonization and land settlement, land reclamation, irrigation and drainage, farm diversification, agrarian reform, rural cooperation, livestock development, afforestation and soil conservation—non-agricultural projects include those in fisheries, forestry, industry and mining.

To many of the developing countries where the population pressure is particularly great, such as those in Asia, international financial and technical assistance is provided to help them to undertake projects for land development and improvement. WFP's participation in this sphere of work has proved useful in mobilizing the latent and potential labor resources required in the successful implementation of such development projects. Many land development projects in the past failed to yield the desired results because the anticipated or assumed follow-up actions to be taken by small landowners, cultivators and local laborers were not forthcoming. Food aid provides such an incentive.



A large increase in production with irrigation

It is estimated that nearly 15 percent of all food aid moved by WFP is directed to land development projects. Land settlement is another field in which food-aid is playing an important role in helping the settlers to tide over the initial stages of land clearing and preparation and crop growing and harvesting. The period involved might be a few months or it might last for several years, depending on the farming enterprises adopted, and the ability and experience of the settlers, as well as on the kind, quality and adequacy of government services and social institutions available. Some of these settlement and resettlement projects are related to agrarian reform programs in the developing countries.

Generally speaking, opportunities for improvements in the farming systems of the less developed countries exist in the adoption of more productive farming methods and the proper choice and combination of more remunerative farm enterprises. Since land is scarce in many of the developing countries the emphasis has to be put in more intensive agriculture. Thus, a substantial number of projects that are being assisted relate to diversification and animal production including dairy development.

In total, the agricultural development projects were reaching 736,800 farmers, workers and settlers and their families, a total of 2.9 million beneficiaries. During 1970, with the assistance of WFP food, 651,290 acres of land were developed or improved and 4,971,850 head of livestock were raised (including 17,430 cattle, 564,100 sheep and 4,324,900 poultry).

Human Resources

Development of human resources is another major field of action for WFP. It includes projects for feeding of students in professional and vocational institutions as well as elementary and secondary schools, of expectant mothers and pre-school children and other special groups. Through better school attendance and better student performance, the children of today should be able to make a greater contribution to the development of their countries when they take over from the present generation.

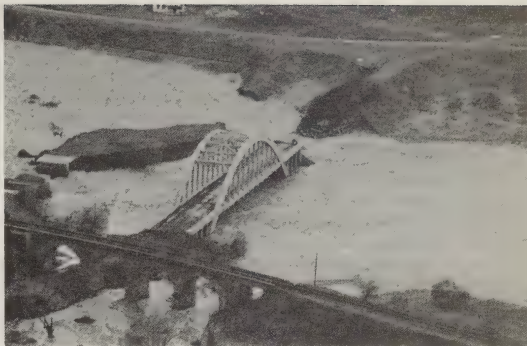


Tunisian workers building stone dams.

At December 31, 1970, the projects of human resources development were reaching 3.4 million beneficiaries, including 98,700 expectant and nursing mothers, 426,400 pre-school children, 2.3 million primary school children, 138,800 secondary school children, 123,900 trainees in prevocational institutions and on-the-job training, 123,800 students in universities and professional institutions, 107,300 trainees in literacy and adult education courses and 53,000 hospital patients.

Infrastructure Development

The development of infrastructure includes projects primarily in the field of community development (housing, schools, dispensaries, water supplies and amenities) and means of communication (country roads which facilitate access to resources and help to mobilize and expand the market for agricultural products). Infrastructural development, although yielding no immediate income, provides the foundation for economic progress. Since labor in most of the less developed countries is abundant and partly unemployed or under-employed, mobilization of such labor for the construction of roads, houses, community amenities, and other essential public works, through the provision of foods, which constitutes more than 60 or 70 percent of the living costs of the labor force in these regions, can be a very effective means for economic and social development. These projects were providing food for



WFP supplies food in times of emergency

830,700 workers and their families, a total of 3.3 million beneficiaries, including workers on self-help projects.

Over the whole period of WFP aid, price stabilization projects provided 33,500 metric tons of grain for five countries in an effort to stabilize grain prices for the benefit of producers and consumers.

The food value per project varies. There are many projects which receive less than \$100,000 in food. There are also a number of projects receiving over \$40 million in food aid. The average is about \$2 million of food per project.

A reason to value
school days.



TABLE 4—DEVELOPMENT PROJECTS BY REGION AND TYPE, JANUARY 1963 TO JUNE 30, 1971^a

Class No.—Title	Latin America Caribbean	North Africa Near East	Africa (s. of Sahara)	Europe	Asia	Total Nos.
1. Mothers, pre-schools.....	8	1	7	—	8	24
2. Elementary schools.....	8	8	17	1	3	37
3. Secondary schools.....	1	2	13	—	4	20
4. Vocational, pre-voc.....	8	9	9	5	2	33
5. Universities, prof. inst.....	2	5	6	1	8	22
6. Literacy, adult educ.....	—	—	3	—	—	3
7. Hospitals, conval.....	5	2	4	—	2	13
8. Public Health.....	—	—	—	2	3	5
9. Housing, public amenities.....	2	11	5	4	—	22
10. Transport, power works.....	—	15	—	—	10	25
11. Community developnebt.....	16	4	12	1	4	37
12. Land development and improvement.....	1	14	7	1	35	58
13. Land settlement, reforms.....	9	12	19	1	11	52
14. Refugee assistance.....	—	1	11	—	—	12
15. Crop prod. and diversif.....	—	6	3	—	1	10
16. Animal prod., dairy.....	7	9	8	6	20	50
17. Forestry.....	9	13	3	24	10	39
18. Fishery.....	1	—	—	1	2	4
19. Industrial, mining.....	—	—	2	11	4	17
20. Food Reserves price stabilization.....	—	—	7	1	—	8
TOTAL.....	77	112	136	39	127	491

^a WFP approved projects.

Source: WFP statistics.

Emergency Relief

In financial terms the WFP is the largest UN contributor to emergency relief. While the main activities of WFP have the objective of promoting development, the Program is called upon each year to undertake a number of emergency operations designed to help countries that are facing urgent situations in which human suffering is involved. Since the Program's inception until the end of June 1971, more than \$105 million of food has been authorized for shipment to 139 emergency situations in 71 countries. This aid, of course, came from various donor countries but Canada was one of the major contributors. In addition to these contributions, Canada recently pledged some \$9.4 million of food aid through WFP channels to help relieve East Pakistani refugees in both India and East Pakistan.

The kind of emergencies that required aid included floods, droughts, refugees (man-made emergencies), earthquakes and volcanoes, typhoons and cyclones, and protein shortages.

The increase in emergency requests to WFP is due partly to the fact that recipient countries are becoming better acquainted with the nature and type of international assistance available in case of emergencies and partly due to the increased number of man-made emergencies.

Emergencies are defined "as urgent situations in which there is clear evidence that an event has occurred which causes human suffering or loss of livestock and which the government concerned has not the means to remedy; and it is a demonstrably abnormal event which produces dislocation in the life of a community on an exceptional scale."

Contributions to WFP under the Food Aid Convention of the International Grains Arrangement requiring shipment within a given time limit, and contributions of resources requiring relatively rapid use, are recognized as appropriate sources of food for emergency use.

TABLE 5—NUMBER OF BENEFICIARIES BY MAIN TYPES OF WFP PROJECT IN OPERATION AND TERMINATED

	Terminated Projects at June 30, 1970		Operational Projects at December 31, 1970	
	Direct Beneficiaries	Dependents/ Staff	Direct Beneficiaries	Dependents/ Staff
	thousands			
<i>Development of Human Resources</i>				
Expectant and nursing mothers.....	90	—	98.7	—
Pre-school children.....	372	—	425.8	—
Primary & secondary school pupils.....	2,038	—	2,470.5	—
University students, trainees of various kinds (tech. & voc. institutes, youth camps, on-the- job training schemes).....	314	—	233.2	—
Literacy and adult education courses.....	77	—	98.7	—
Hospital patients and convalescents.....	55	—	53.1	—
TOTAL:.....	2,946		3,380.0	23.7
<i>Social and Economic Infrastructure</i>				
Public health programs.....	11	—	10.5	—
Housing, public amenities, transport and communications.....	74	292	71.0	272.6
Community development.....	761	2,642	749.3	2,247.4
TOTAL:.....	846	2,934	830.8	2,520.0
<i>Directly Productive Projects</i>				
Land development, crop production, fisheries..	313	780	411.7	1,200.7
Land settlement.....	188	672	139.3	539.1
Refugees.....	65	—	55.9	35.2
Forestry.....	107	414	102.7	416.7
Industry, mining.....	29	—	27.3	16.6
TOTAL:.....	702	1,866	736.9	2,208.3
GRAND TOTAL.....	4,494	4,800	4,947.7	4,752.0

* These are estimates only.

Source: WFP statistics.

The principle of purchasing food from developing food exporting countries for use as aid is applied by the WFP in emergency operations, in which it uses its resources to procure available food from any developing country in the vicinity of the emergency.

The pattern of project development in the different regions is shown in Table 4. The number of beneficiaries total ten million. A breakdown showing beneficiaries by projects is given in Table 5. It is significant to note that nearly half of the developing countries receiving WFP aid still have a national income of less than \$150 per year.

IMPLEMENTATION OF DEVELOPMENT PROJECTS

Requests for food aid by developing countries are channeled through the United Nations Development Program (UNDP) Resident Representatives who act on behalf of the Executive Director of the World Food Program. The Executive Director of WFP and his staff review these requests first and in some cases,

it may be necessary to send a survey mission on the spot, to examine the conditions and facilities of the project in consultation with the local authorities.

Any country eligible for UNDP aid is eligible for WFP food assistance. The countries for which WFP aid is most relevant are those which meet the following general criteria: those which have serious food deficits; balance of payments difficulties and insufficient food aid from other sources; and which are not at a very advanced stage of development but, have available from internal or external sources adequate administrative capacity to use food aid effectively. Criteria for project acceptance include technical soundness, economic feasibility, relevance to national development, adequacy of local arrangements for carrying out the project and handling the food aid, and improbability of harmful effects to trade and local production.

Project requests which involve the interests of the other UN agencies are referred to them for scrutiny and advice. For instance, the United Nations



Healthier cattle
benefiting from
WFP supplies



Workers accept half
their wages in food

is interested in community development. Training in new skills and labor employment is of interest to the International Labour Organization (ILO). School-feeding concerns both UNESCO and UNICEF. Agricultural, forestry and fishery projects fall in the purview of FAO. If the aim of a project is to improve the health of people, the World Health Organization (WHO) is consulted. Food aid is frequently tied in with the assistance programs of the UNDP, and refugee relief and rehabilitation operations are undertaken in cooperation with the United Nations High Commissioner for Refugees (UNHCR). In most cases, continuous cooperation is maintained with these agencies throughout the life of the respective projects.

Projects which have been judged sound after these lengthy scrutinies and consultations are summarized and submitted for approval to the UN/FAO Intergovernmental Committee. This Committee meets twice a year. To avoid delays, projects which involve food aid less than U.S. \$750,000 in food and feed can be approved by the Executive Director, and in cases of special urgency, projects which cost more than U.S. \$750,000 may be approved by the Committee through correspondence.

After a project has been approved, a special Operations Agreement has to be negotiated between the recipient government and the WFP, and signed for each approved project. These agreements set out all the details of the project including the specified kinds, amount and schedules of food commodities to be supplied by the WFP and the recipient government's counterpart contributions and specific obligations in handling and distributing these food commodities. Thus the approval of a project proposal does not ensure that the project becomes operational. Commitment of WFP resources does not become binding until the special operations agreement has been signed and the recipient government has sent in a letter signifying readiness to accept.

After the Operations Agreement has been signed, the WFP requests the donor countries to ship from their pledges the required kinds and amount of commodities. Donor governments are responsible for providing the commodity including delivery of the food on board ship at the port of departure or loading at the frontier exit point. From there, the WFP assumes the responsibility for transportation, including insurance, to the arrival port of the re-

cipient country, or in the case of a land-locked country, to its frontier.

After the commodity has arrived the responsible agencies of the recipient government take over. The WFP's responsibility for supervision begins with superintendence at the time of loading and unloading of the commodities and continues surveillance of the handling of aid to ensure that it is utilized in accordance with conditions agreed on. Recipient governments have to provide progress reports quarterly and annually and final audited accounts.

The Executive Director of the WFP is required to submit an annual progress report to the Intergovernmental Committee for each project in operation. When it is completed, a terminal report is submitted, assessing the technical progress that has been made and, if possible, the effect of the aid on the social and economic development in the country.

Management and Administration

The management of resources pledged to WFP by 90 countries with about two-thirds of the countries pledging commodities, and the deployment to projects and emergencies in more than 70 countries is an extremely complex task. It involves not only the assessment of project proposals but a matching of the food needs of the proposed project with the foods available to WFP from commodity pledges, as cash for the purchase of otherwise unavailable commodities has not been available in sufficient quantity to permit such purchases to play a significant role in broadening the range of foods available. After projects have been approved and agreements signed, the task of arranging for shipment of the food from a number of different countries is such a way as to ensure continued availability in each host country without the creation of excessive stocks is a more complicated operation than is carried out by any bilateral food aid program. The fact that the host government and not WFP is the executing agency for actually operating the project, with WFP staff in the field (the UNDP Resident Representatives and WFP advisers and project officers) playing an advisory and monitoring role, means that WFP, while continuing to bear full responsibility for effective use of the food, does not retain complete control of the food until its final distribution to ultimate consumers.



¹Including Barbados, Costa Rica, Dominican Republic, Guatemala, Guyana, Haiti, Honduras, Surinam and Trinidad & Tobago.

²Including Yemen and Southern Yemen.

³Including Cameroon, Central Africa Republic, Zaïre, Dahomey, Ethiopia, Gabon, Gambia, Guinea, Liberia, Madagascar, Malawi, Mauritania, Niger, Senegal, Sierra Leone, Somalia, Swaziland, Tanzania, Togo, Uganda and Zambia.

⁴Including Cambodia, and Mekong Regional.

WFP FOOD AID: BY COUNTRY AND BY VALUE
OF FOOD AID RECEIVED, 1963-1970

Country	U.S. \$ million
LATIN AMERICA	
1 — Mexico	13.95
1.A — Jamaica	2.92
2 — Panama	1.98
3 — Columbia	49.28
4 — Ecuador	2.49
5 — Peru	2.01
6 — Brazil	8.12
7 — Bolivia	7.72
8 — Chili	3.96
9 — Paraguay	1.67
Others ^a	4.97

SOUTH EUROPE

10 — Yugoslavia	1.09
11 — Malta	1.24
12 — Cyprus	11.10
13 — Greece	0.40
14 — Hungary	1.33

NORTH AFRICA AND NEAR EAST

15 — Turkey	52.23
16 — Syria	30.83
17 — Iraq	25.26
18 — Jordan	16.95
19 — Lebanon	6.53
20 — U.A.R.	89.98
21 — Sudan	30.50
22 — Tunisia	42.16
23 — Algeria	49.60
24 — Morocco	17.04
Others ^b	3.05

AFRICA — SOUTH OF SAHARA

25 — Mauritius	8.93
26 — Nigeria	4.54
27 — Ghana	6.80
28 — Upper Volta	5.30
29 — Ivory Coast	3.87
30 — Chad	4.50
31 — Congo	4.33
32 — Burundi	5.12
33 — Botswana	11.22
34 — Lesotho	18.98
Others ^c	32.85

ASIA

35 — Afghanistan	7.73
36 — Pakistan	9.61
37 — Nepal	1.26
38 — India	85.08
39 — Ceylon	15.13
40 — Malaysia	11.52
41 — Philippines	6.64
42 — Indonesia	3.18
43 — Taiwan	43.35
44 — Korea	29.59
Others ^d	0.40

THE ROLE OF CANADA

Canada was a founding member of the World Food Program and from the very beginning was among the major contributors. Since 1966, Canada has been the second largest contributor. The Canadian contribution is not limited to wheat only. The commodities provided have made it possible to attain a more balanced calorie/protein food basket. Canadian delegations have participated actively in the executive body of the WFP—the Intergovernmental Committee. In 1963, a Canadian, A. H. Turner, now Deputy Minister of Agriculture in British Columbia was chairman of the IGC. This year another Canadian, the author of this paper is serving as chairman.

It should be noted that the Canadian contribution is only part of Canada's food aid package. The bulk of Canadian food aid is of a bilateral nature. One significant difference between bilateral and multilateral aid is that the WFP is project oriented. When WFP Canada's food aid goes to specific projects, covers many countries with a wide diversity of food products.

Through the WFP, Canada has shipped since 1963 agricultural products for aid purposes to 66 countries. Over 25 percent of these products went to the Middle East and North African countries. Other countries are located in the Far East, in Africa, and in Latin America. More than one Canadian product is shipped to a recipient country. For example Algeria received through the WFP the following Canadian agricultural products: skim milk powder, wheat, wheat flour, dried beans, fried peas, egg powder, canned cheese, and butter oil. Chile received whole milk powder, canned cheese, skim milk powder, dried fish, and canned fish. Of the 66 countries, 41 received Canadian wheat or wheat flour. In total, Canada has shipped through the WFP between January 1963 and August 1971, \$40,670,086 of grains, \$14,822,342 of dairy products, \$2,518,388 of pulses, \$3,529,845 of fish and \$810,211 of egg powder.

In which economic and social development projects were Canadian agricultural products utilized? The following are a few examples: boarding school pupil feeding, assistance to vocational training centres, literacy campaign, reforestation and rural development, improvement of milk supply through toning of milk, soil conservation and tree planting, improvement of orchards, land reclamation, construction of agricultural roads, self help housing, construction of feeder roads and airport runways.

TABLE 6—WFP SHIPMENTS OF GRAINS FROM CANADA DURING 1970

	Wheat	Wheat Flour	Barley
metric tons			
<i>LATIN AMERICA</i>			
Paraguay.....	15	—	—
TOTAL.....	15	—	—
<i>NORTH AFRICA AND NEAR EAST</i>			
Algeria.....	26,781.2	3,680	—
Iraq.....	14,707.4	11,045	—
Sudan.....	512	3,165	—
Morocco.....	—	93	—
U.A.R.....	—	12,697	—
Yemen.....	—	2,856	—
Southern Yemen.....	—	7,560	—
Syria.....	—	—	9,800
TOTAL.....	42,000.6	41,096	9,800
<i>EUROPE</i>			
Cyprus.....	—	732	2,200
TOTAL.....	—	732	2,200
<i>AFRICA S. SAHARA</i>			
Mauritania.....	43	156	—
Gabon.....	—	122	—
Gambia.....	—	33	—
Lesotho.....	—	39	—
TOTAL.....	43	350	—
<i>ASIA</i>			
Afghanistan.....	1,022	—	—
Taiwan.....	28,462.2	—	—
Indonesia.....	—	19	—
TOTAL.....	29,484.2	19	—
GRAND TOTAL.....	71,542.8	42,197	12,000

Source: WFP statistics.

Canada has also contributed through the WFP food to meet emergencies. Between January 1963 and September 1971, \$11,881,766 worth of Canadian foodstuffs have been shipped to 27 countries. The countries receiving this emergency aid include Afghanistan, Bolivia, Greece, Jamaica, Kenya, Pakistan, Sudan, Trinidad, and the United Arab Republic. The commodities shipped include wheat, fish, skim milk, peas and beans, and cheese.

The WFP can request from Canada (or from any other contributing country) only what has been pledged. Thus for the year 1971, Canada has pledged U.S. \$15 million of which 22 percent is in cash. This leaves \$11.7 million for commodities. The country then informs the Executive Director which commodities can be made available and the quantity of each commodity in dollar terms. If necessary, Canada in consultation with the World Food

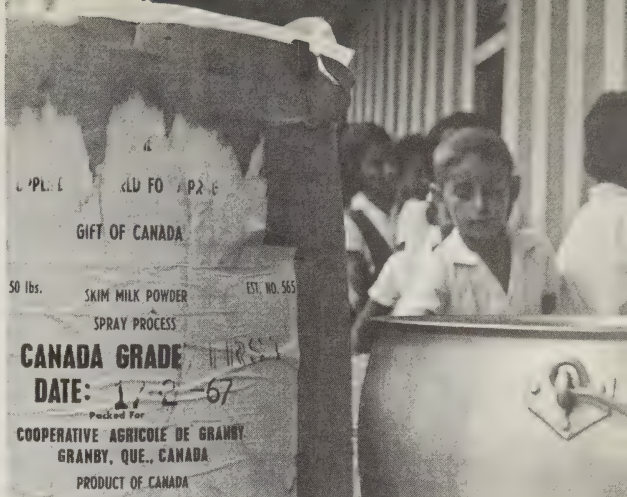
Program may from time-to-time change the composition and quantity of commodities pledged. Commodities pledged are usually in excess of likely commercial requirements. The value of Canada's contribution, that is per commodity unit value is determined by the WFP. This is in line with the rules and regulations. The unit value is usually a close approximation of a world price on a major world market; e.g., wheat in the London market. This procedure prevents countries from using the WFP to rationalize high domestic price supports.

CONCLUSION

The ultimate solution to the food problem of the developing countries lies in increased production in the developing countries with a food deficit.

The future of the WFP depends on the member-nations of the United Nations and the FAO. Contributions are made on a voluntary basis. Unlike cash, food cannot be stored in banks accumulating interest. It must be utilized within the period delivered. Not all the food contributed is equally acceptable. Since food aid is dependent on supplies already produced, the level of the contribution by a country reflects its existing food stockpiles. The operations of the Program therefore, require a great deal of flexibility, pragmatism, as well as medium and long-term planning. Food aid by itself is not necessarily the most efficient or effective form of aid. It is obvious that food aid should be phased out long before other forms of international assistance are ended.

In the meantime, however, there is the problem of accelerating the rate of development. There will continue to be a need to meet food deficits in countries with serious foreign exchange difficulties, where lack of inputs and skills will continue to act as retarding factors to production. Food shortages will still occur as a result of crop failures, other natural disasters and man-made emergencies. There are still too many hungry people. Recent studies indicate that although progress is expected in the production of food, such production in developing countries is not yet expected to expand quickly enough to eliminate malnutrition by the end of this decade. At the same time patterns of income distribution will continue to prevent the market from distributing available food at the level of nutritional needs, in particular so far as the vulnerable groups of the population are concerned. The fact is that many people in the developing countries will continue to suffer from a lack of sufficient calories and



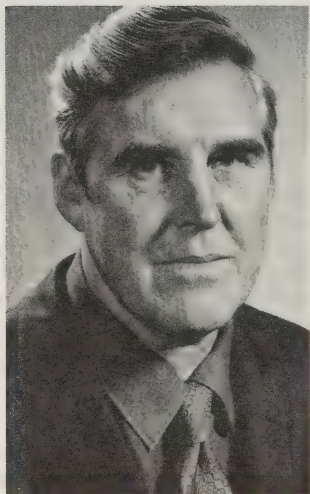
proteins to meet their daily requirements, either from local production or through imports on commercial terms.

At the same time, it would appear that for some time to come, reflecting economic and agricultural policies, weather and technology that there could be the recurrence of supplies of agricultural commodities in excess of commercial requirements. The commodities in surplus will vary from year-to-year and so will the quantities.

There is general agreement that food supplies in excess of commercial demand, should continue to be used to an increasing extent constructively to meet the unsatisfied food needs of people in developing countries and to assist in their economic and social development, particularly through a project-oriented approach. This does not mean that donor countries use food aid as a rationalization for bad agricultural policies or restrictive trade practices.

The experience of the past nine years shows that there is place for multilateral food aid. It is able to provide food aid without interfering with commercial trade. By itself the WFP can accomplish little, not even stop-gap action. However, by supporting projects for improvement and investment in agriculture, and the rural sector generally, it assists agricultural development. Furthermore, this type of aid does not duplicate the aid efforts of other international agencies. The objective is to complement the work of the other UN agencies. Thus food aid, in combination with other forms of capital and technical assistance, is an effective resource to achieve economic and social progress in the developing countries and alleviate undernourishment and malnourishment.

LOCAL MARKETS FOR NOVA SCOTIA APPLES



Declining export and processing sales are forcing Nova Scotia apple growers to turn to local fresh markets. Local markets are growing and changing; requiring quality fruit, suitably packaged.

*Cliff Retson**

Nova Scotia's apple industry's main problem is marketing. Production problems face growers too. Export markets which in the past have absorbed up to 80 percent of the commercial Nova Scotian crop have been seriously reduced in recent years. The entry of Britain into the European Common Market will bring further marketing problems.

Where and how to market the crop is a perennial problem for packers, processors and growers alike. While each tends to emphasize certain aspects of marketing there is general agreement in the current situation that any outlet which offers some prospect for expanding sales should be investigated. Apple marketing, like charity, begins at home, and one such outlet, the Nova Scotian market, is currently receiving increased attention.

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Current efforts to expand local markets represent one of a series of steps taken by growers to adjust to changes taking place in their industry. For nearly 100 years overseas export markets provided the mainstay for apple growing in Nova Scotia. Since World War II import quotas and other restrictions, combined with increasing competition on fresh fruit markets, have forced more and more apples into processing. Outlets for processed products both overseas and in Canada have in turn been restricted by severe price competition. Faced with declining sales in his major markets the grower has been forced to turn to other outlets and here, as elsewhere, the pressure is increasing.

Data on the disposition of the Nova Scotia apple crop (Table 1) indicate the nature and extent of some of these developments. These include heavy emphasis on fresh fruit exports prior to World War II and the shift to processing and decline in produc-

TABLE 1—DISPOSITION OF APPLE PRODUCTION OF NOVA SCOTIA, SELECTED YEARS 1931-1969

Year	Production	Processed	Sold Fresh		
			Outside Canada	In Canada	In Nova Scotia
			thousand bushels		
1969.....	3,050	2,034	240	776	679
1968.....	2,790	2,047	197	546	472
1967.....	3,500	2,561	283	656	579
1966.....	2,962	2,095	257	610	514
1965.....	3,100	2,232	328	540	489
1964.....	2,430	1,669	259	502	439
1963.....	3,180	2,265	368	547	464
1962.....	2,461	1,667	390	404	341
1961.....	3,151	1,921	638	592	417
1960.....	2,243	1,326	335	482	363
1949.....	3,742	1,303	1,583	856	n.a.
1938.....	6,572	753	5,316	503	n.a.
1933.....	8,288	1,273	6,803	212	n.a.
1931.....	4,534	551	3,657	325	n.a.

n.a. — not available

Source: Statistics Canada and Richards, A. E., Prices and Returns on Nova Scotia Apples, Technical Bulletin No. 29—Economics Division, Canada Department of Agriculture, Ottawa, 193—.

tion resulting from loss of markets in the post war period. Thus, while other markets have declined from 1960 to 1969, sales of Nova Scotia apples within the province as reported by Statistics Canada increased from 363 thousand to 679 thousand bushels, an increase of over 22 per cent (Table 1).

Information on recent developments in apple marketing in Nova Scotia is available from a study conducted by the Economics Branch, Canada Department of Agriculture. The study, undertaken as a joint project with the Nova Scotia Department of Agriculture and Marketing, provides data on the characteristics, potential and other aspects of local markets, as well as the volume of apples involved. Basic data for the study were provided by

the 65 packing plants and grower packers marketing apples in Nova Scotia from the 1969 crop. Information on farm sales to secondary receivers were secured from a random sample of one-third of all registered apple growers, not classified as packers, in Annapolis and Hants Counties and one-fifth of those in Kings County. Data were also secured from a number of firms marketing apples including 17 wholesalers, 78 retailers and 14 roadside stands located throughout the province.

Commercial apple production is located in the Annapolis Valley. This is a narrow strip of land located a few miles inland from the Bay of Fundy and extending for about 100 miles along its south side. Provincial markets are located in close prox-

TABLE 2—SALES OF NOVA SCOTIA APPLES BY GROWERS AND PACKERS TO VARIOUS MARKETING OUTLETS IN THE PROVINCE, 1969-70 CROP YEAR

Market Outlet	Grower Sales		Packer Sales		Total Sales	
	bushels	percent	bushels	percent	bushels	percent
Wholesalers.....	3,630	1.5	206,385	37.7	210,015	26.6
Chain stores.....	6,090	2.5	75,212	13.8	81,302	10.3
Other retailers.....	77,355	31.8	67,785	12.4	145,140	18.4
Truckers.....	80,760	33.2	61,706	11.3	142,466	18.0
Roadside stands.....	47,354	19.5	113,965	20.8	161,319	20.4
Direct to consumers.....	21,367	8.8	14,300	2.6	35,667	4.5
Peddlers.....	6,670	2.7	7,140	1.3	13,810	1.7
Pick your own.....	—	—	800	1.1	800	0.1
All outlets.....	243,226	100.0	547,293	100.0	790,519	100.0

TABLE 3 — VARIETIES OF NOVA SCOTIA APPLES SOLD IN THE PROVINCE BY 17 WHOLESALE AND 78 RETAIL OUTLETS, 1969-70 CROP YEAR

	Sales by			
	Wholesalers		Retailers	
	bushels	percent	bushels	percent
Early apples	1,063	0.7	1,519	1.3
Cooker Gravenstein	3,872	2.8	2,580	2.3
Gravenstein	10,780	7.7	14,006	12.5
McIntosh and McIntosh type	85,963	61.4	54,744	48.8
Delicious and Spy	34,938	25.0	35,854	32.0
Other varieties	3,320	2.4	3,489	3.1
Total	139,936	100.0	112,192	100.0

imity to producing areas and apples move to market through various channels of distribution and marketing agencies including truckers, peddlers, roadside stands and direct farm sales to consumers, as well as via packing plants and the wholesale and retail trade. Since there is little control over local movement it is difficult to secure data on the volume of apples entering these markets and the relative amount handled by the various types of organizations involved.

Data secured from packers, wholesalers, retailers and roadside stands generally confirmed the upward trend in local sales of Nova Scotia apples. Of 175 firms contacted, 103 reported increased sales during the past five years. The data also suggest this outlet may be more important than is indicated by official statistics. Total sales of Nova Scotia apples on local markets as compiled by the study (Table 2) were 111 thousand bushels higher than the volume reported by official statistics and accounted for one-quarter of the 1969 commercial crop.

Channels of Distribution

As indicated by the data in Table 2, 547 thousand bushels or 68.2 percent of local sales of Nova Scotia apples were distributed by packers. Some 65 firms or individuals were involved and all but six of these conducted growing, as well as, packing operations. The balance or about one-third of local fresh fruit sales moved directly from farms to first line receivers and presumably consisted in large part of ungraded apples. Nearly two-thirds of packer sales went to the wholesale and retail trade. The two main outlets for grower sales were truckers and non-chain retailers. Since truckers sell a considerable amount of produce to retailers it is probable that the retail outlets are more important than indicated by the study data. The volume of apples sold through roadside stands has increased rapidly in recent years and in 1969

accounted for about one-fifth of both grower and packer fresh fruit sales in the province. While there is considerable interest in "pick-your-own" operations and they are expected to expand, they were a minor factor in 1969.

Data secured from 17 wholesalers and 78 retailers located in the main urban centres of the province (Table 3) provide some indication of the varieties of apples preferred by the trade and by consumers in Nova Scotia. Wholesalers confined their operations in large part to McIntosh, McIntosh crosses (mostly Cortlands) and Delicious, while retailers handled a slightly higher proportion of other varieties.

Prior to World War II, plantings in the Annapolis Valley were devoted in large part to the culinary and dessert varieties favored by the British market. Since the War, emphasis has been largely on McIntosh and Delicious, with many of the other varieties diverted to processing. As indicated by the data in Table 4, nearly three-quarters of the retail stores had increased sales of McIntosh during the past five years while 61.6 percent had increased sales of Delicious and Spy.

While plantings have declined from former years, continuing demand for Gravenstein on local markets is reflected by the fact that nearly one-half the retailers reported increased sales of this variety. The use of Gravenstein as an early cooker, however, appeared to have little favor. Only a few retailers reported increased sales of early varieties. There has been some increase in plantings of early varieties and about one-third of the packers and one-quarter of the roadside stands reported increased sales of these varieties during the past five years. None of the retailers reported increased sales of other varieties but many felt it desirable to carry small stocks of a few varieties to meet the demand from special customers.

Quality

Quality which includes requirements for color, size, shape, as well as texture and flavor, is a major factor influencing the sale of apples. On Nova Scotia markets it is also a matter of considerable controversy. With emphasis focused on export markets the traditional complaint of consumers was that the better quality apples were shipped abroad and the balance marketed at home. The fact that apples imported into the province frequently carry the premium grade "Canada Extra Fancy" while local apples are sold almost entirely as Canada Fancy or lower grades, adds to consumer complaints of difficulties in securing good quality Nova Scotia apples (Table 5).

As indicated by the data in Table 5, there has been an upward trend in the percentage of "Fancy's" sold on local markets in the past five years. Much of this improvement has occurred in the past two years. Comments on quality by the trade were generally summarized by one wholesaler who noted, *"During the past two years, there has not been much reason to complain. Before that, it was bad"*. While there was no significant variation in the proportion of Fancys and Cees handled by wholesalers and retailers in 1969-70, changes in the ratio of these grades appear more pronounced at the retail level during the past five years. Possibly one reason for this is that there is a decline in the volume of apples handled by itinerant truckers and peddlers and a substantial increase in the amount distributed by small packers and grower-packers. These provide a regular service to retailers and have used improved quality as a means of holding or expanding their markets. While the general trend was greater emphasis on Fancys, a number of wholesalers and retailers reported increased sales of Cee grade apples. Such firms (generally located in lower income areas of the province) noted that price was more important than grade as a factor influencing sales. A further factor influencing movement



of Cees, as well as total sales, is the practice of overgrading. As previously noted, little use is made of the Extra Fancy Grade and most packers include such apples in their Fancy pack. In periods of increased competition, the tendency to overgrade Cees is even more pronounced. Apples of the better grades are deliberately added to improve the appearance and sale of this pack.

Overgrading is most apparent at roadside stands. While it is done primarily to increase sales of low quality fruit, an added advantage is that it cuts grading costs. Roadside stands carried a wider

TABLE 4—TRENDS IN SALES OF VARIETIES OF APPLES IN 78 RETAIL STORES IN NOVA SCOTIA, 1965-69

Varieties	Percent of Stores Reporting Sales		
	Increasing	Decreasing	Unchanged
Early apples.....	3.5	—	96.5
Cocker Gravenstein.....	1.7	83.3	15.0
Gravenstein.....	48.7	14.1	37.2
McIntosh and crosses.....	74.4	—	25.6
Delicious and Spy.....	61.6	5.1	33.3
Other.....	—	11.6	88.4

TABLE 5—GRADES OF APPLES SOLD IN 1969/70 CROP YEAR AND TRENDS IN GRADES SOLD BY 17 WHOLESALE AND 78 RETAILERS IN NOVA SCOTIA, 1965-69

	Canada Fancy Grade	Canada Commercial Grade
Wholesalers:		
Sales 1969/70, bushels.....	113,522	26,414
Percent of total sales 1969/70...	81.1	18.9
Percent stores reporting changes in grades of apples sold 1965/69		
Increasing.....	47.1	11.8
Decreasing.....	—	35.3
No change.....	52.9	52.9
Retailers:		
Sales 1969/70, bushels.....	92,787	19,405
Percent of total sales 1969/70..	82.7	17.3
Percent of stores reporting changes in grades of apples sold 1965/69		
Increasing.....	65.4	3.9
Decreasing.....	—	62.8
No change.....	34.6	33.3

range of quality than wholesalers and retailers but reported a similar upward trend in terms of the grades of apples sold. While dealing with a more transient customer, they emphasized that success in their operation was in large part dependent on return calls and these could only be secured by meeting consumer requirements for quality.

Apple Size

Closely associated with quality and grade is the question of apple size. Wholesalers, retailers and operators of roadside stands were asked to indicate consumer preference for five sizes of apples ranging from 2¼ inches in diameter to 3 inches and up. Where preference was expressed in terms of a range (e.g. 2½"—2¾"), both sizes were designated as the first choice of the consumer (Table 6).

TABLE 6—CONSUMER PREFERENCE FOR SIZES OF APPLES AS REPORTED BY 17 WHOLESALERS, 78 RETAILERS AND 14 ROADSIDE STANDS IN NOVA SCOTIA, 1969/70 CROP YEAR

Size of Apple	Percent of Firms Reporting this Size as the First Choice of their Consumers		
	Wholesalers	Retailers	Roadside Stands
	percent		
2¼".....	28.6	4.9	7.1
2½".....	49.6	59.8	57.2
2¾".....	19.0	31.7	28.6
3 & up".....	4.8	3.6	7.1
All sizes.....	100.0	100.0	100.0

Consumer preference as indicated by the trade was mainly for the 2½" apple, with the 2½"—2¾" range accounting for over 90 percent of the first choice by consumers at retail stores and roadside stands. Wholesalers appeared to favor a slightly smaller apple, but most of those preferring the smaller sizes were wholesalers who handled a relatively small volume of apples.

Wholesalers and retailers were also asked to comment on consumer preferences in terms of uniform versus variable sizes of apples in the pack. For poly bags 71 percent of wholesalers and 78 percent of retailers felt that uniformly sized packs were preferred. Forty-one percent of wholesalers and 68 percent of the retailers also felt that poly bag displays should include a number of size ranges similar to those provided in cell packs. Uniformly sized apples, it was felt, provided a more attractive pack and increased sale of the better quality fruit.

For Cee grade apples uniformity was of little significance. In contrast to this, 29 percent of the wholesalers and 19 percent of retailers felt a variable sized pack was desirable and particularly from the standpoint of economy. Less emphasis on uniformity of size, it was stated, reduced packing costs and variation in size within the pack provided the housewife with some larger apples which could be used for cooking and smaller apples for eating.

Packages and Containers

Packages and containers are an important factor influencing sales of apples. Those in use reflect the combined influence of various factors including economy, convenience, and adaptability in terms of handling, transporting, storing and displaying the fruit, as well as providing a measure of protection as it moves from packing house to point of consumption. The transition from the three bushel wood stave barrel to the one bushel box to the current five pound poly bag reflects changes over the years in the relative importance attached to these factors by the trade and consumers in Nova Scotia.

The five pound poly bag was the main package and unit of sale for apples handled by firms in the study (Table 7). It accounted for over three-quarters of sales at the retail level and combined with the three-pound poly bag provided the container for about 90 percent of apples moving through wholesale and retail outlets. Other packages and containers used by wholesalers and retailers included cells, trays, baskets, boxes and hampers. However, these accounted for only about 10 percent of sales and much of this consisted of cell and tray packs.

Packages and containers at roadside stands differed considerably from those in use by the wholesale and retail trade. Operators of roadside stands sold only about one-quarter of their apples in poly bags and made much more use of baskets, boxes, hampers and paper bags. It was frequently noted, however, that many of these containers were used mainly for holding or display purposes. In order to save on cost of containers, apples were frequently transferred to paper bags at time of sale. The additional handling and inconvenience was justified on the grounds that it permitted the customer to inspect the fruit.

Trends in Containers

Wholesalers, retailers and to a lesser extent operators of roadside stands reported an upward trend in use of poly bags and most felt this trend would continue. Because of minimal protection, the poly bag is

TABLE 7—PACKAGES AND CONTAINERS USED IN SALE OF APPLES BY 17 WHOLESALERS AND 78 RETAILERS IN NOVA SCOTIA 1969/70 CROP YEAR

Type of Package or Container	Sales by			
	Wholesalers		Retailers	
	Bushels	percent	Bushels	percent
Five pound poly bags	101,691	72.7	87,241	77.8
Three pound poly bags	23,097	16.5	14,923	13.3
Cell packs	7,413	5.3	3,414	3.0
Tray packs	6,265	4.5	5,066	4.5
Four quart baskets	1,080	0.8	1,204	1.1
Other	390	0.2	344	0.3
Total	139,936	100.0	112,192	100.0

frequently criticized, particularly by growers and packers who feel it is responsible for much of the complaint over poor quality apples. Since it normally results in a saving of 40 percent or more in the cost of containers, there is also a tendency to assume that this is the factor mainly responsible for its increased use in recent years. A point frequently overlooked is that while all phases of the industry are involved, it is, in large part, the consumer who has dictated its use and consumer preference in turn is based not only on a single factor but rather on a number of considerations. The poly bag is inexpensive, readily visible, convenient to handle, fits into the family refrigerator, and holds an amount which generally meets the family needs between shopping trips. While it has some obvious deficiencies these are more than offset by its many advantages in terms of economy, convenience, adaptability and sales pro-

motion. Until a replacement appears on the market (none appears imminent), the recommended program would seem to be one of attempting to minimize the effect of its short comings while exploiting its many advantages. Related recommendations included better temperature control on retail counters, elimination of multi-tiered displays which result in increased customer handling and bruising of fruit, and better training and supervision of workers at all stages of the marketing program. There was some suggestion that bruising could be reduced by better positioning of poly bags in master containers but opinion on this point was divided.

Use of other containers was generally reported as unchanged or declining by wholesalers and retailers. Their use on local markets was confined largely to institution, holiday, or loose purchases. Tray and

TABLE 8—SEASONAL DISTRIBUTION OF SALES OF NOVA SCOTIA APPLES BY 17 WHOLESALE AND 78 RETAIL OUTLETS IN THE PROVINCE, 1969-70

	17 Wholesale Outlets			78 Retail Outlets		
	Number Reporting Sales	Sales per Firm Reporting	Total Monthly Sales	Number Reporting Sales	Sales per Firm Reporting	Total Monthly Sales
		bushels			bushels	
August	6	850	5,101	68	55	3,743
September	14	895	12,528	77	130	9,983
October	16	1,086	17,376	78	199	15,544
November	17	993	16,875	78	197	15,343
December	17	1,097	18,656	78	195	15,174
January	17	910	15,478	78	176	13,699
February	17	1,047	17,794	78	160	12,466
March	17	888	15,089	78	150	11,706
April	10	1,337	13,374	72	131	9,410
May	7	998	6,989	49	90	4,404
June	1	676	676	36	20	720
July	—	—	—	—	—	—
Monthly average	—	—	11,661	—	—	9,343
Annual total	17	8,232	139,936	78	1,438	112,192

cell packs were used for shipment of high quality fruit. Baskets were used mainly for early apples, while hampers had virtually disappeared except at roadside stands. Some increase was noted in the use of trays, including the small trays holding about six apples. Such packs which consist of a tray and a plastic cover are basically a combination of the tray and the poly bag.

As previously noted, trends in containers reflect changes taking place in the industry. The barrel and box of former years were used for both export and local markets. In today's more specialized industry, the poly bag provides a more acceptable replacement on local markets while tray and cell packs are preferred for export shipments. The size, simplicity and low cost of the poly bag also makes it readily adaptable to small packing operations and presumably is a factor in the substantial increase in such operations in recent years. Finally, and most important, is its value in terms of merchandizing and consumer acceptance which has helped to increase sale of apples on local markets.

Seasonality

Monthly sales of Nova Scotia apples by wholesalers and retailers followed a similar pattern (Table 8). Commencing with a small volume in August, sales in 1969-70 increased sharply in September and October and tended to level off during November and December. From January to April, there was a gradual decline in sales followed by a sharp drop in May and another in June. While there was some suggestion that increased emphasis on early varieties would increase sales, wholesalers and retailers felt the main emphasis should be placed on maintaining adequate supplies of good quality apples during the latter part of the season. It was noted that much of the sale of imported B.C. Delicious and Quebec Controlled Atmosphere (C.A.) stored apples occurred at this time. While the local supply situation was improving, it was stated that local C.A. apples were cleared out too early in the year.

Price Policy

Since market reports and other publications by the Canada Department of Agriculture and provincial departments of agriculture provide detailed information on prices paid for apples by varieties, grades, packages, and major wholesale and retail markets, such data has not been included in this report. As a matter of related interest, however, wholesalers and retailers were asked to provide data on mark-ups and pricing policy. Most of the 15 wholesalers

providing data reported a fixed mark-up on apples with 10 percent the rate most frequently used. Others reported variable rates ranging from a low of five to a high of 20 percent. The average rate charged by wholesale firms was 12.5 percent. Eight wholesalers reported their mark-up on apples as the same as that charged for other fruit, such as bananas and oranges. Six reported a lower mark-up for apples while one reported a higher rate than that charged for other fruit. Retail mark-ups on apples ranged from a low of 18 to a high of 35 percent with an average rate of 27.5 percent for all firms reporting. Twenty-seven retailers reported mark-ups for apples lower than those for other fruit, 47 used the same mark-up while two firms had a higher mark-up for apples than for other fruit (Table 9).

Area Markets

To secure data on the geographic distribution of Nova Scotia apple marketing, the province was divided into six areas. Growers and packers were asked to provide data on their sales in these areas which are described as follows:

1. Southwestern Nova Scotia —
the counties of West Hants, Annapolis, Digby, Yarmouth, Shelburne, Queens and Lunenburg
2. Halifax —
the Halifax-Dartmouth area and Halifax County
3. Central Nova Scotia —
East Hants, Colchester and Cumberland Counties
4. Eastern Mainland —
Pictou, Antigonish and Guysborough Counties
5. Cape Breton Island

Highest per capita sales of apples were reported in Southwestern Nova Scotia (Table 9). This is to be expected since the area includes the Annapolis Valley and adjoining counties. Of the 252 thousand bushels of apples sold in the area 60 percent were direct sales by growers. Packers also reported heavy sales to truckers operating in this area. It will be appreciated that data for this and other areas are approximate only since packers and farmers frequently had some difficulties in indicating the final destination of all apples sold.

Halifax had highest total sales and ranked second in per capita sales of apples. It was followed by Cape Breton Island. The larger packers felt that Halifax and the Sydney area of Cape Breton had the greatest potential for expanding sales but smaller packers

TABLE 9—SALES OF NOVA SCOTIA APPLES IN VARIOUS MARKET AREAS OF THE PROVINCE, 1969-70 CROP YEAR

Market Area	Population (1966)	Total Sales Nova Scotia Apples	Sales per capita
Bushels			
Southwest Nova Scotia.	193,582	252,879	1.31
Halifax.....	244,948	273,858	1.12
Central Nova Scotia....	78,356	45,256	0.58
Eastern Mainland.....	72,210	44,866	0.62
Cape Breton.....	166,943	173,660	1.04
Province.....	756,039	790,519	1.05

tended to favor Central and Eastern Mainland Nova Scotia. Total and per capita sales of apples in the Central and Eastern Mainland appear relatively low. Presumably one reason for this is that some sales credited to Halifax were purchases by wholesalers which were subsequently distributed in the Central and Eastern mainland. Another factor is extensive sales of New Brunswick apples in Central Nova Scotia as well as some movement to Eastern Mainland areas.

Promotion

As a final question, all those co-operating in the study were asked if additional promotion was required and the types of programs felt most effective in increasing sales of apples. Virtually all were agreed that more promotion was necessary.

Reference was made to the substantial amount of promotion given to competing types of fruit and it was felt that because apples have a high degree of eye appeal and other characteristics, a comparable pay-off could be expected. More use should be made of radio and T.V. advertising including programs conducted by home economists with demonstrations, recipes and mail-out material available. It was felt that such programs currently being conducted could be improved with the addition of more educational material such as varieties of apples, including their characteristics and uses, quality problems and considerations and other related information which would be of interest and assistance to the housewife. Others felt that more use should be made of point of sale material including stickers, slogans and displays. In commenting on this, one wholesaler noted that the supply of such material sent from Washington State, USA and British Columbia greatly exceeded that received from Nova Scotia.

Current promotion programs, it was noted, were conducted by a number of organizations often acting independently. A better organized and co-ordinated program would be more effective. The initiative for developing such a program it was suggested, should come from the Provincial Department of Agriculture. In view of the importance of processing, it was felt promotion should be extended to include processed apples as well as fresh fruit. More promotion should be given to solid pack apples including specials such as those provided for juice and sauce.

One point noted by enumerators in the study was the store-to-store variation in merchandising techniques, the general appearance of displays and other efforts promote sale of apples. In line with this one packer emphasized that growers and packers should do more follow-up work with the trade and attempt to improve the manner in which their apples were handled and sold. The volume of apples sold was in large part a direct reflection of the interest, initiative and ability of the produce manager. Promotional programs should include assistance and training including short-courses for produce managers and handlers as well as special recognition for a job well done.

A PRODUCTION PROFILE

OF MANUFACTURING MILK

AND CREAM PRODUCERS



Over one half of Canada's manufacturing milk is shipped by one quarter of the manufacturing milk producers.

The average manufacturing milk enterprise is over three times as large as the average cream producing enterprise.

Nearly three quarters of the cream is shipped by about a third of the cream producers.

*H. J. Mestern**

Every month all dairy plants record the deliveries of each patron on so-called "prelistings". These are pre-printed forms which give each producer's registration number and name. Milk and cream shipments are entered on separate sets of prelistings and, to date, all shipment data are recorded in terms of butterfat. These data form the basis for monthly subsidy payments and also become a statistical profile of the primary dairy industry.

The profile shows the range of production levels, the distribution of producers and the proportion of supplies originating from producers with different levels of production. In other words, it pinpoints the heavy, medium and light producers. The program data of the Canadian Dairy Commission provide a fairly complete overview of the manufacturing side of the industry from 1966 to 1971. These data are the actual farm sales of manufacturing milk and cream to dairy plants, which are recorded centrally in the Data Processing Service of the Canada Department of Agriculture. Yang (1, 2) has analyzed Canadian data for 1969-70.

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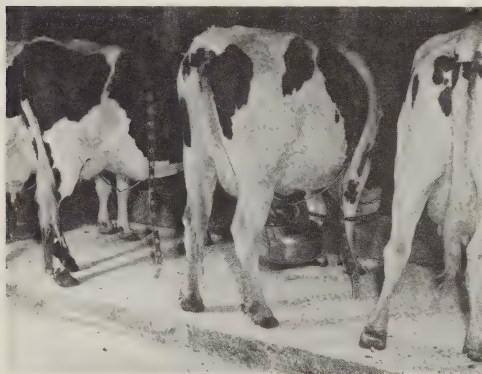
This article will, first, update these structural data, and then elaborate on the regional aspects of these figures. It should be clearly understood that the size of milk or cream shipments is not taken as a measure of the size of operation of these farms. The total output of many farmers is rather substantial, with "dairying" being a comparatively small enterprise. For a discussion of the relative position of dairying within the framework of the total farm enterprise the reader is referred to White and Heighton's study of a large survey of dairy farms (3).

This paper will deal with the scale of the dairy enterprise only. Such considerations have significance for two reasons. Firstly, large dairy operations tend to become specialized commercial milk farms, and generate the major share of farm income from dairying. The rising proportion of producers in this category of milk shippers indicates the degree to which the primary manufacturing milk sector is dependent on viable commercial dairy production. Secondly, the magnitude of supply from producers in this commercial category has important implications for the secondary sector, the manufacturing plants. Large milk producers use farm bulk coolers for milk storage

which facilitate pickup by bulk tankers which transport the milk to plants. At the plant level, milk reception from bulk tankers allows a substantial gain in efficiency compared with the handling of milk in cans. For this reason the second part of the analysis will treat manufacturing milk and cream separately.

Changes in Numbers of Producers and Quantity Shipped by Size Category

The rate of increase of large producers was about the same as the rate of decrease of producers in the smallest category. Manufacturing milk and cream producers shipping 6,300 pounds of butterfat or



more (180,000 pounds of milk) numbered 9,649 in 1966-67 and reached 14,027 in 1970-71, up 45.4 percent in four years. This substantial increase occurred in spite of the overall decrease in the number of producers, 37.7 percent (Table 1).

The number of small producers decreased sharply. Those with deliveries of less than 700 pounds of butterfat per year (20,000 pounds of 3.5 percent B.F. milk) fell by 54.6 percent. The rate of reduction diminished gradually up the scale of shipment. Until 1968-69, producers with annual deliveries between 4,200 and 5,599 pounds of butterfat were increasing in number, then began to decline. The number of producers in the next higher level of milk and cream shipments (5,600 to 6,299 pounds of butterfat, 160,000 to 180,000 pounds of milk) increased until 1969-70, but declined for the first time in 1970-71.

The changes in the quantity delivered in these shipment levels follows essentially the same magnitude as the number of producers. The quantity supplied by the largest producers rose 53.3 percent, compared with an increase in their number of 45.4 percent (Table 2).



Changes in the Profile of Milk Producers

The main change in the profile of manufacturing milk shippers has been a reduction in the number of small operations and an increase in large dairy farms. In 1970-71, 26 percent of the largest milk producers shipped 53 percent of the manufacturing milk in Canada. These producers had shipments over 180,000 pounds of milk (over 6,300 pounds of butterfat). Four years earlier, farmers in this level represented 13 percent of the producers and 42 percent of Canadian shipments of manufacturing milk.

The proportion of total supply originating from the two classes of large farms varied across Canada in 1970-71. However, with 93 percent of the manufacturing milk producers being located in Quebec and Ontario, the focus is on Central Canada. In Quebec, 23.6 percent of the producers supplied 49.1 percent of the volume. In Ontario, 33.5 percent of producers supplied 59.5 percent of the milk volume. In Manitoba, the figures were 31.2 percent versus 55.1 percent; in Alberta, 40.1 percent versus 67 percent; in British Columbia, 25.1 percent versus 53.9 percent. In the Maritimes, the concentration of production in the larger shipment categories was less pronounced. Nevertheless, 2.4 percent of the milk producers in P.E.I. supplied 10.8 percent of the volume which was ten times more than the lowest group (13 percent versus 1.3 percent). This relationship between the highest and the lowest producing groups holds for all provinces (Table 3).

Changes in the Profile of Cream Producers

The cream producing sector is distinct, having shrunk greatly in size, yet maintaining its profile, over the years. Ninety five percent of the cream producers shipped below 120,000 pounds (milk equivalent). The

TABLE 1—NUMBER OF MANUFACTURING MILK AND CREAM PRODUCERS REGISTERED WITH THE CANADIAN DAIRY COMMISSION, BY SIZE OF SHIPMENT, 1966-67 TO 1970-71.

Shipments in lb. B.F.	Number of Producers					Changes	
	1966/67	1967/68	1968/69	1969/70	1970/71	1970/71	1970/71
						1969/70	1966/67
percent							
Less than 100.....	52,859	46,942	34,550	27,239	23,973	-12.0	-54.6
100-1399.....	32,935	27,532	23,059	19,524	17,120	-12.3	-48.0
1400-2099.....	21,560	18,563	16,061	13,771	12,233	-11.2	-43.3
2100-2799.....	15,246	13,717	12,153	10,638	9,386	-11.8	-38.4
2800-3499.....	11,197	10,307	9,508	8,451	7,480	-11.5	-33.2
3500-4199.....	7,983	7,535	7,430	6,919	6,082	-12.1	-23.8
4200-4899.....					4,971		
4900-5599.....	10,371	10,250	10,426	10,291	4,108	-11.8	-12.5
5600-6299.....	3,261	3,466	3,742	3,767	3,394	- 9.9	+ 4.1
6300-10,499.....		8,902	10,519	11,518	10,520	- 8.7	
10,500+.....	9,649	2,243	3,016	3,711	3,507	- 5.5	+45.4
Total.....	165,061	149,457	130,464	115,829	102,774	-11.3	-37.7

TABLE 2—SHIPMENTS OF MANUFACTURING MILK AND CREAM BY PRODUCERS REGISTERED WITH THE CANADIAN DAIRY COMMISSION, BY SIZE OF SHIPMENT, 1966-67 TO 1970-71.

Size of Shipment in lb. B.F.	Quantity of B.F. Shipped					Changes	
	1966/67	1967/68	1968/69	1969/70	1970/71	1970/71	1970/71
						1969/70	1966/67
						percent	
Less than 100.....	17,329	14,768	11,052	8,641	7,643	-11.5	-55.9
100-1399.....	33,632	28,151	23,619	20,077	17,617	-12.3	-47.6
1400-2099.....	37,251	32,155	27,870	23,884	21,202	-11.2	-43.1
2100-2799.....	37,068	33,360	29,541	25,897	22,860	-11.7	-38.3
2800-3499.....	35,049	32,279	29,777	26,508	23,486	-11.4	-33.0
3500-4199.....	30,585	28,895	28,509	26,552	23,337	-12.1	-23.7
4200-4899.....					22,561		
4900-5599.....	50,152	49,629	50,543	49,928	21,537	-11.7	-12.1
5600-6299.....	19,357	20,561	22,226	22,364	20,150	- 9.9	+04.1
6300-10499.....		70,131	83,528	91,820	83,811	- 8.7	
10,500+.....	84,671	29,581	40,082	49,034	46,035	- 6.1	+53.3
Total.....	345,094	339,512	346,748	344,705	310,239	-10.0	-10.1

TABLE 3—PERCENTAGE DISTRIBUTION OF MILK PRODUCERS REGISTERED WITH THE CANADIAN DAIRY COMMISSION AND THEIR SHIPMENTS, 1966-67 AND 1970-71.

	P.E.I.		N.S.		N.B.		QUE.		ONT.		MAN.		SASK.		ALTA.		B.C.		Canada	
	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.
MILK — 1966/67																				
											— % Distribution —									
Less than 700	28.4	4.9	27.8	4.9	31.1	4.9	15.9	1.6	8.3	0.6	31.3	6.0	25.0	4.9	12.6	1.2	17.3	1.9	13.9	1.3
700 to 1399	23.0	13.1	23.9	13.5	17.5	10.0	13.0	4.7	9.0	2.1	23.6	14.1	16.7	8.9	11.8	3.6	18.4	6.5	12.0	3.7
1400 to 2099	17.4	16.6	14.4	14.4	15.6	14.6	13.7	8.3	9.8	3.8	13.8	13.7	25.0	25.6	12.2	6.2	18.7	10.9	12.5	6.5
2100 to 2799	11.9	16.1	19.4	17.8	10.7	14.5	13.5	11.3	10.0	5.5	11.7	16.5	8.3	11.8	11.7	8.4	10.2	8.5	12.2	8.8
2800 to 3499	6.3	10.9	2.5	16.1	9.1	14.5	11.5	12.4	9.4	6.6	6.3	11.4	25.0	48.8	12.7	11.6	6.5	6.8	10.7	9.9
3500 to 4199	3.6	7.6	5.0	10.8	7.1	14.5	8.9	11.7	8.8	7.6	4.3	9.7	—	—	8.8	9.8	6.5	8.7	8.7	9.8
4200 to 4899	5.9	15.5	3.5	9.5	6.1	16.1	11.6	19.3	14.9	16.2	5.6	15.4	—	—	13.1	18.6	8.5	14.2	12.5	17.9
4900 to 5599	0.9	3.1	2.0	6.9	1.4	4.4	3.6	7.3	5.8	7.7	1.4	4.8	—	—	4.4	7.6	2.7	5.6	4.2	7.4
5600 to 6299	2.6	12.2	1.5	6.1	1.4	5.7	8.3	23.4	24.0	49.9	2.0	8.4	—	—	12.8	32.9	11.2	36.9	13.3	34.7
6300 to 10499	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0
10,500 +	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0
Total in %	1,008		201		429		41,761		22,206		716		12		1,950		294		68,577	
Total in number	1,812		349		787		121,673		99,153		1,237		20		6,685		865		232,581	
Total in pounds ('000 lbs. B.F.)	1,798		1,736		1,835		2,914		4,465		1,727		1,648		3,428		2,941		3,392	
Average per farm (lbs. B.F.)																				
MILK — 1970/71																				
Less than 700	13.0	1.3	12.1	1.8	17.1	1.4	9.3	0.6	6.9	0.4	5.5	0.3	32.2	2.9	4.1	0.2	18.0	0.9	8.5	0.5
700 to 1399	14.5	5.1	25.2	11.5	7.6	2.2	7.9	1.9	6.0	1.2	5.5	1.1	12.9	5.9	4.9	0.9	10.7	2.6	7.4	1.7
1400 to 2099	14.7	8.4	15.4	11.5	14.6	8.4	9.6	3.9	6.6	2.2	5.3	1.8	6.5	4.4	6.4	1.9	7.1	2.6	8.7	3.2
2100 to 2799	16.0	12.4	14.3	14.7	11.4	9.0	10.3	5.7	7.7	3.6	9.5	4.6	9.7	10.3	8.0	3.2	7.1	4.3	9.6	5.1
2800 to 3499	10.6	10.5	13.2	17.6	10.1	10.2	10.2	7.3	8.0	4.7	10.6	6.4	3.2	4.4	8.2	4.2	7.1	5.2	9.5	6.4
3500 to 4199	7.2	8.9	5.5	8.3	10.8	13.2	9.0	7.9	8.6	6.2	7.2	5.4	19.4	35.3	7.9	5.1	3.6	3.5	8.8	7.2
4200 to 4899	5.3	7.7	2.2	4.1	8.7	12.9	7.9	8.2	7.9	6.8	8.9	7.8	9.7	20.6	6.8	5.1	7.1	7.8	7.8	7.6
4900 to 5599	5.2	8.7	3.3	7.4	5.7	10.6	6.6	7.8	7.7	7.6	8.9	9.0	3.2	7.4	8.1	7.1	7.1	9.6	6.9	7.8
5600 to 6299	3.7	7.1	4.4	11.1	5.7	9.4	5.6	7.6	7.1	7.8	7.4	8.5	3.2	8.8	5.5	5.3	7.1	9.6	6.1	7.6
6300 to 10499	7.4	19.1	4.4	12.0	5.7	13.2	17.9	32.1	24.5	37.0	24.0	37.4	—	—	27.3	37.0	21.5	44.3	19.8	33.7
10,500 +	2.4	10.8	—	—	2.6	9.4	5.7	17.0	9.0	22.5	7.2	17.7	—	—	12.8	30.0	3.6	9.6	6.9	19.2
Total in %	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0
Total in number	621		91		158		32,556		14,542		733		31		1,320		28		50,080	
Total in pounds ('000 lbs. B.F.)	1,935		218		499		143,124		77,427		3,799		68		7,998		115		235,183	
Average per farm (lbs. B.F.)	3,116		2,396		3,157		4,396		5,324		5,183		2,195		6,059		4,091		4,696	

TABLE 4—PERCENTAGE DISTRIBUTION OF CREAM PRODUCERS REGISTERED WITH THE CANADIAN DAIRY COMMISSION AND THEIR SHIPMENTS, 1966-67 AND 1970-71.

CREAM — 1966/67	P.E.I.		N.S.		N.B.		QUE.		ONT.		MAN.		SASK.		ALTA.		B.C.		Canada		
	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	No.	lb.	
— % Distribution —																					
Less than 700.....	36.1	14.3	67.6	26.3	40.5	12.5	34.2	6.1	32.1	6.9	49.5	17.4	65.4	30.6	47.7	13.8	60.9	22.6	47.3	14.1	
700 to 1399.....	30.3	21.1	18.2	25.8	29.8	25.6	26.2	20.7	24.7	16.4	28.6	30.4	24.0	35.5	24.7	22.6	22.6	28.4	25.5	23.7	
1400 to 2099.....	16.5	22.1	7.2	17.1	15.2	22.1	17.8	23.4	16.4	18.3	12.7	22.8	7.1	17.9	13.1	20.5	9.9	22.5	13.1	20.4	
2100 to 2799.....	8.5	16.2	3.7	12.8	7.1	14.7	10.7	19.1	11.0	17.2	5.0	12.6	2.1	7.4	6.7	14.7	3.1	9.9	6.7	14.8	
2800 to 3499.....	4.2	10.2	1.6	6.8	3.8	10.0	5.7	13.1	6.7	13.5	2.2	7.0	0.8	3.9	3.6	10.1	1.8	7.4	3.5	10.1	
3500 to 4199.....	2.2	6.5	0.7	3.9	1.5	4.9	2.6	7.3	3.9	9.6	1.1	4.2	0.4	2.0	1.8	6.3	0.7	3.1	1.8	6.2	
4200 to 4899.....	1.5	5.7	0.7	4.6	1.4	5.7	2.1	7.2	3.6	11.0	0.7	3.6	0.2	1.8	1.6	6.7	0.8	4.9	1.4	6.6	
4900 to 5599.....	0.2	1.0	0.2	1.4	0.2	1.2	0.3	1.2	0.7	2.6	0.1	0.9	0.03	0.2	0.4	1.9	0.2	1.3	0.3	1.5	
5600 to 6299.....	0.5	2.9	0.1	1.3	0.5	3.3	0.4	1.9	0.9	4.5	0.1	1.1	0.06	0.7	0.4	3.4	—	—	0.4	2.6	
6300 to 10499.....																					
10,500 +.....																					
Total in %.....	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—
Total in number.....	3,043	2,350			2,847	16,572	22,704	15,455	24,020	15,803	15,030	15,600	23,453	23,390	614	103,527					
Total in pounds ('000 lbs. B.F.).....	3,879	1,672			1,170	1,370	1,554	951	665	1,103	771	1,087									
Average per farm (lbs. B.F.).....	1,275	711																			
CREAM — 1970/71																					
Less than 700.....	22.1	4.3	56.7	16.6	28.2	6.1	26.7	5.4	22.5	3.6	42.4	12.2	53.0	18.5	37.7	8.1	55.0	17.5	38.5	8.9	
700 to 1399.....	25.4	14.5	20.3	22.0	26.4	16.1	24.4	14.8	20.9	10.4	28.4	25.5	27.8	31.5	24.1	16.5	22.1	23.0	25.3	18.6	
1400 to 2099.....	20.4	19.0	12.0	21.8	16.8	17.4	18.1	18.4	17.5	14.6	14.7	22.3	10.9	21.0	14.7	17.2	12.1	22.2	14.7	18.3	
2100 to 2799.....	12.2	16.1	5.2	13.5	11.4	16.5	12.5	17.7	12.7	14.9	7.5	16.1	4.4	11.9	9.1	14.7	5.2	13.7	8.6	15.0	
2800 to 3499.....	7.8	13.3	2.4	7.9	7.3	13.7	7.2	13.2	8.6	13.0	3.6	9.9	1.8	6.5	5.7	12.1	2.2	7.5	5.1	11.3	
3500 to 4199.....	4.7	9.8	1.1	4.3	4.1	9.1	4.7	10.5	6.1	11.2	1.6	5.5	0.9	3.7	3.5	9.0	1.3	5.2	3.0	8.3	
4200 to 4899.....	3.1	7.6	0.8	3.8	2.1	5.6	2.9	7.7	4.2	9.2	0.9	3.6	0.5	2.4	2.0	6.2	1.7	8.5	2.1	6.1	
4900 to 5599.....	1.7	4.9	0.3	1.7	1.2	3.7	1.6	4.7	2.7	6.7	0.5	2.1	0.3	1.6	1.3	4.7	0.4	2.4	1.1	4.2	
5600 to 6299.....	0.8	2.5	0.7	4.4	0.6	2.1	1.0	3.5	1.7	4.7	0.2	1.2	0.2	1.1	0.8	3.1	—	—	0.7	2.9	
6300 to 10499.....	1.6	6.9	0.5	4.0	1.6	7.3	0.9	3.5	2.9	10.6	0.2	1.6	0.2	1.4	1.2	6.2	—	—	0.9	5.4	
10,500 +.....	0.2	1.1	—	—	0.3	2.4	—	0.2	0.2	1.1	—	—	0.03	0.4	0.2	2.2	—	—	0.1	1.0	
Total in %.....	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—	100.0	—
Total in number.....	1,823	998			1,509	6,706	7,312	8,919	13,698	13,037	231	54									
Total in pounds ('000 lbs. B.F.).....	3,333	949	2,518	11,477	15,219	10,043	12,077	19,229	212	75,057											
Average per farm (lbs. B.F.).....	1,828	951	1,669	1,712	2,081	1,126	882	1,475	918	1,384											

PERCENTAGE DISTRIBUTION OF REGISTERED PRODUCERS AND THEIR SHIPMENTS - 1970-71



FIGURE 1

remaining five per cent of the producers, with relatively large cream deliveries in 1970-71 (over 4,200 pounds of butterfat—the butterfat from about 120,000 pounds of milk) shipped about 20 percent of the volume. If lower shipment levels are included, a little over one third shipped 72.5 percent of the cream in 1970-71. This would include all producers who shipped over 1,400 pounds of butterfat as cream which is equivalent to the butterfat in 40,000 pounds of milk. The figures for this same group in 1966-67 were 27.2 percent and 62.2 percent respectively. In 1970-71, two thirds of small scale cream shippers sold less than one third of the volume (Table 4).

Provincial cream profiles look very much alike. Over half of all cream shippers in each province shipped less than 1,400 pounds of butterfat in 1970-71 with exception of Ontario (43 percent) and P.E.I. (47 percent). Quebec had 71 percent of the shippers at this shipment level; New Brunswick, 54 percent; Alberta, 62 percent; Manitoba, 70 percent; Nova Scotia, 77 percent and Saskatchewan, 81 percent. The national average for 1970-71 was 64 percent.

Summary

Data from producers registered with the Canadian Dairy Commission indicate that manufacturing milk producers are much larger shippers, on average, than cream producers. The number of milk producers who had shipments of over 180,000 pounds of milk (over 6,300 pounds of butterfat) increased by 45 percent in the four years 1966-67 to 1970-71. They represented 26 percent of the producers and enlarged their share of the volume of shipments from 42 to 53 percent. In contrast, the lowest producing 24.6 percent of the producers supplied only 5.4 percent of the manufacturing milk.

The typical profiles of milk and cream producers is highlighted by telescoping the production range into two levels: above 1,400 pounds of butterfat (40,000 pounds of milk), and below 1,400 pounds.

In the "below" group, milk producers are a minority of 25.9 percent and sold only five percent of the milk. In the "above" group, are 74.1 percent of the milk producers selling 95 percent of the milk.

Cream producers, in contrast, are dispersed around a lower average level of shipment. There are relatively few large cream shippers. Within the lower range of shipment, cream shippers with deliveries below 1,400 pounds of butterfat formed a majority of 63.8 percent, supplying 27.5 percent of the cream. Farmers

who delivered over 1,400 pounds a year represented 36.2 percent of cream producers yet supplied 72.5 percent of the cream.

Notes and References

1. Yang, W. Y.—"Changes in Producers' Shipments of Manufacturing Milk and Cream under the operation of the Canadian Dairy Commission". *Canadian Farm Economics*, Vol. 5, No. 1, April 1970, p. 25-32.
2. Yang, W. Y.—"Changes in the Manufacturing Milk and Cream Industry under the Canadian Dairy Commission in 1969-70". *Canadian Farm Economics*, Vol. 5, No. 5, December 1970, p. 38-52.
3. White, W. J., Heighton, V. A.— *The Structure of the Canadian Manufacturing Milk and Cream Industry*, Economics Branch, Canada Department of Agriculture, Ottawa, March 1968.

POLICY AND PROGRAM DEVELOPMENTS IN CANADA

AGRICULTURAL PRODUCTS BOARD ACT

(Turkey Purchase Program)

The Agricultural Products Board has been authorized to purchase by tender up to 1.8 million pounds of canned turkey meat (approximately 4 million pounds of eviscerated turkey) and, to store, transport, process and package this turkey meat. The Federal Government has also authorized the Board to incur a loss relating to the above purchase and sale of canned turkey meat not exceeding \$400,000. (October 5, 1971).

This purchase action is the first taken under the recently announced program designed to assist producers of agricultural products adversely affected by the United States surcharge.

There has been an imbalance between supply and demand in the Canadian turkey industry this year. The supply-demand position was further distorted by the U.S. surcharge. The surcharge amounts to between 3 to 4 cents per pound for eviscerated turkeys.

Mr. Olson expressed hope that the industry will move to avoid a repetition of an over-supply situation. "All provincial turkey marketing boards have agreed to a 10 percent cutback in their planned 1972 production, Mr. Olson said, and "I anticipate that the joint effect of the two actions will be a significant improvement in the turkey market".

Details of the purchase program were issued by the Agricultural Products Board, Room 939, Sir John Carling Building, Ottawa, K1A 0C5.

AGRICULTURAL PRODUCTS CO-OPERATIVE MARKETING ACT

(Ontario Bean Producers' Marketing Board)

Under authority of the Agricultural Products Co-operative Marketing Act, the Minister of Agriculture has entered into an agreement for the marketing of beans produced in Ontario in 1971, with the Ontario Bean Producers' Marketing Board in London, Ontario.

The Board will market on a co-operative plan Canada No. 1 Eastern Yellow-eye Beans and Canada No. 1 Eastern Pea Beans. The initial payments paid to producers will be \$5.76 per hundredweight for the grades designated above.

Any further payment will have to be authorized by the Governor General in Council. If the yearly average wholesale price exceeds \$9.10 per cwt. for pea beans and \$12.35 per cwt. for yellow-eye beans, producers and processors will share the returns, processors getting seven percent of that surplus.

On the other hand, if the Board were to incur a loss, the Minister undertakes to pay the difference between the average wholesale price realized for such beans, and the initial payments together with the actual average carrying and processing costs (these not exceeding \$0.35 per cwt. for carrying, \$1.25 per cwt. for processing of pea beans and \$2.00 per cwt for processing of yellow-eye beans). In no case will the Minister be responsible for payments if the average wholesale price exceeds \$7.36 per cwt.

This agreement will remain effective until December 31, 1972. (November 1971).

FOWL SLAUGHTER PROGRAM

The fowl slaughter program is aimed at stabilizing egg supplies. Starting November first, for a period of eight weeks, it offers financial inducement to egg producers to reduce the size of their laying flocks.

A problem in surplus egg supplies was alleviated earlier this year when the Agricultural Products Board purchased egg stocks for powdering and distribution to the WFP (see *Canadian Farm Economics*, Vol 6, No. 3 Aug. 1971, p. 21). This further move is being undertaken to prevent a buildup in egg stocks as a result of the curtailment of exports to the United States.

Payments to producers under the fowl slaughter program will be made from the Agricultural Stabilization Board's working fund. These payments will supplement prices received by producers in disposing of some of their hens through processing plants.

Current slaughter is 2,300 thousand in an average eight-week period. This total has been set as the base for payments in the program, and the amount producers receive per bird depends on the total slaughter in the eight weeks. The program's target is an additional reduction of 320 thousand hens. The payments will increase proportionately to the increase in slaughtering. If the target is reached, the payment on the 2,640 thousand birds will amount to 6.4 cents per bird.

Egg producers must dispose of their hens by marketing them through registered poultry processing plants. To support their claims, they should also retain all receipts for fowl delivered to processors for slaughter from November 1, 1971 to December 24, 1971. (October 29, 1971).

RETROACTIVE REDUCTION OF DAIRY HOLDBACK

A new rate of holdback is now being applied to all in-quota deliveries of manufacturing milk shipped since April 1, 1971. It will be effective on future milk payments and there will be a refund to producers on previous deliveries for the difference between the earlier rate and the revised rate.

The holdback from payments to dairy farmers on in-quota deliveries of manufacturing milk has been lowered to 10 cents per hundred pounds of milk, or 2.85 cents per pound of butterfat. The previous rate was 26 cents in April and May and was lowered to 20 cents in June.

The refunds and future savings will add about \$8.5 million to the income of shippers of manufacturing milk in the 1971-72 dairy year.

There has been a significant improvement in the international and domestic dairy marketing situation. Surpluses, including those of Canada, have been reduced substantially and world prices are much firmer. With the heavy producing season now past, the Commission's costs for the year ending March

31, 1972, can now be clearly estimated, thus permitting reduction in the hold-back on in-quota milk to the 10 cent rate.

POTATO SUPPORT PROGRAM

The federal government, through the Agricultural Stabilization Board, will buy potatoes from Canadian farmers to stabilize domestic market prices. The Board will offer to buy bagged Canada No. 1 potatoes for \$1.50 a hundredweight.

At the rate of \$1.50 per cwt., each farmer will be able to sell potatoes to the Board on contract, to a maximum of \$2000 or 1,333 cwt.

Farmers who sell on contract, will keep the potatoes on their farm, and receive an advance payment of 75 cents per cwt. The Board will call for delivery date. As for the balance payment, it will come at the end of the program.

This purchase program was introduced to offset the adverse effects of the U.S. 10 percent surcharge on Canadian exports. The cash payments are also intended to end distress sales and sacrifice prices. Furthermore, the removal of supplies from the market should improve prices, particularly in New Brunswick, where prices have been the lowest. Closing date for applications is January 31, 1972 and full details and application forms may be obtained from Canada Agriculture Fruit and Vegetable Division offices across Canada. (November 10, 1971).

DEVELOPMENTS ABROAD

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Canada Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

Grains

World Grain Trade Increases in 1970-71

With 1970-71 marketing season for grains, except corn and sorghum, now ended in the Northern Hemisphere, it is estimated that world trade in grains recorded so far is about 10 percent greater than in 1969-70. In view of the good 1971 harvests in some of the main importing areas, there may be a significant decline in commercial trade in 1971-72, but the aid requirements of some Asian countries, notably East Pakistan, may be very substantial. Shipments recorded in the first weeks of the 1971-72 season were estimated to be about a tenth lower than in 1970-71.

Demand for imported grains is likely to be weak in the first months of 1971-72 and international prices of grains are expected to fall to well below their abnormally high level of last autumn. But with the lower carry-over off-setting the increase in the new harvests, prices may hold up over the season to around their level of other recent years. In Britain the domestic grain market is now protected by the imposition of levies on cheap imported grains but domestic prices have still fallen to around the target indicator prices for wheat and barley which are the basis for determining the rate of deficiency payments under the guaranteed price system. [Grain Bulletin—Commonwealth Secretariat, September 1971].

U.S. Corn Crop

The USDA has estimated the national corn crop at 5,265 million bushels. The prospective corn harvest exceeds expected needs for domestic uses and exports by more than 600 million bushels. This excess of crop over needs is second only to that of 1948, when the harvest exceeded needs by nearly 700 million bushels.

Australian Wheat Exports

Provisional data for the 1970-71 wheat year, which ended November 30, indicate that export shipments of wheat might have reached 307 million bushels. This would be about 13 million bushels more than the previous record wheat shipment established in the 1966-67 season. Exports of flour should account for a further 15 million bushels.

The record year is attributed to good sales of Australian wheat in Europe, the Middle East, Africa, and Latin America. Sales have been lower only in the Asian region because the Peoples Republic of China has not bought from Australia. Sales to other countries in that region, namely to Japan, Malaysia, Singapore, South Korea, and Taiwan have been good. The biggest boost to Australian sales this year have been in sales to Africa, where shipments to the Arab Republic of Egypt will total about 59 million bushels. To the Middle East shipments to Iran and Iraq together will account for about 37 million bushels of wheat. [Canadian Assistant Commercial Secretary, Melbourne].

India Becoming Self-Sufficient in Wheat

Thanks to the Green Revolution, India is becoming self-sufficient in wheat. The planned five million tons buffer stock of imported wheat has already been built up, and the Food Corporation's target of buying four million tons from local farmers has already been exceeded by a million tons. Supplies are still flowing in steadily, leading to what is being currently referred to as the "problem of plenty." India may not require imports and could well be seeking export markets next year. Some are even so optimistic as to maintain that India's wheat revolution has come to stay to an extent that future poor monsoons will not have any significant effect on production and supplies and therefore imports are no longer required by this country. [Canadian Commercial Officer, New Delhi].

Dairy Products

International Dairy Situation

The international dairy situation showed a striking change in 1970-71. The huge surpluses of butter and skim milk powder, accumulated during the second half of the 1960's almost disappeared. Within a year, world prices of most milk products doubled or trebled, with skim milk powder and butter prices reaching all time highs in recent months. The change is best illustrated by the fact that EEC, the main surplus producing area of the late sixties, withdrew subsidies on exports of a number of important dairy products, and Britain, the leading importer, suspended its almost ten-year-old system of butter import quotas.

The unexpectedly rapid reversal is the combined result of policy measures, undertaken by surplus producing countries to encourage demand and to curtail production, as well as of more general social and economic factors that have led to an accelerated decline in the attractiveness of dairy farming in high-income countries, and of unfavorable weather conditions.

The main cause of the decline in milk output in Western Europe has been a reduction of dairy cow numbers since the end of the sixties. EEC's program to reduce dairy herds through slaughtering premiums and a milk-to-beef production conversion scheme which covered almost 500,000 cows in 1970 and 1971, about 2.4 percent of the total dairy herd of the Community.

The process of adjusting milk production to commercial outlets was facilitated by the decreasing attractiveness of dairy farming both as an occupation and as an enterprise in high-income countries. The main factors responsible for this situation are the intensive and almost unremitting demand for labor in milk production and the unfavorable structure of dairy farming in most developed countries. [FAO—Monthly Bulletin of Agricultural Economics and Statistics—July/August 1971].

Livestock

Danish Bacon Exporters Extend Container Service to the U.K.

Danish exporters want to keep their hold on the bacon market and the Danish bacon exporters association, which consists of 56 cooperative and eight private slaughterhouses producing for export

only, has further extended container service to the U.K. by the purchase of 400 containers, the last 30 of which were completed in August 1971. The first 400 containers were brought into service in 1967 and the number very soon doubled. The containers are constructed to hold 360 sides with a total weight of between 9.5 and 10 tons. The internal temperature is maintained at a constant 4°C (39°F) necessary for maintaining quality. Three special ships were built fitted with loading equipment and automatic washing plants each capable of holding 113 containers in two superimposed holds, a total of 1,100 tons of bacon. [Agra Europe].

World Wool Market

An overall assessment of the major factors affecting the world wool market suggests that wool prices will firm during the 1971-72 season. Although total available supplies of wool will be greater owing to larger stocks in supplying countries, continuance of existing stock holding policies by the wool commissions in the main exporting countries will tend to minimize the price depressive impact of these extra quantities. Some increase in wool textile activity in a number of the main wool manufacturing countries is expected and the rising trend of usage of wool in the centrally planned and developing countries is likely to continue. The improvement in the market is likely to be gradual and the magnitude of any price rise difficult to predict.

The anticipated pick up in textile activity coupled with some easing of the intense competitive pressure from synthetic fibres, should be a direct benefit to wool. The firming of the wool market at the close of last season suggests that an upturn in prices may have already commenced. [Canadian Assistant Commercial Secretary, Melbourne].

USDA and FDA To Tighten Controls

The U.S. Department of Agriculture and the Food and Drug Administration have announced their intention to impose additional restrictions and controls on the use of diethylstilbestrol. Diethylstilbestrol (DES), a growth promoting hormone, is used extensively in livestock feeds. The new regulations are being issued in response to the USDA's finding of DES residues in ten liver samples.

The new restrictions announced will require that livestock feeds containing DES must be withdrawn from the ration at least seven days prior to slaughter. This compares to the present 48 hour withdrawal

period. Although the 48 hour period is scientifically adequate when observed, FDA concluded that a seven day withdrawal period is a more practical period of time and is more certain to be followed. Also, it offers an additional margin of safety.

Oilseeds

Sunflower Seed Cultivation in Spain

The area planted to sunflower seeds in Spain has risen by over 150 percent in the last two years to more than 160,000 hectares. The average yield has increased from 0.6 tons per hectare six years ago, when the cultivation of this crop was first introduced into this country on a large scale, to one ton per hectare in 1970.

Both the production and consumption of edible seed oil is being promoted in Spain in order to obtain more olive oil for export markets. Technical assistance and a bonus on production of sunflower seeds are granted by the Ministry of Agriculture. The Ministry of Agriculture also encourages the production of soybeans in Spain. [Canadian Assistant Commercial Secretary, Madrid].

General

Fewer Leave Land in Britain

One of the most striking features of the 1971 farm census figures is that, for the time being at least, the flight from the land, shown in the numbers of employed workers, seems to have been halted. Between 1960 and 1970, it has fallen by more than a third. A good many factors seem to have contributed to this.

The general employment situation outside agriculture is not as buoyant as it was. Wages, conditions and prospects on the farm have notably improved during the last couple of years. Credit stringency and high interest rates have meant fewer large-scale farm amalgamations and enlargements and less tendency to invest heavily in new machinery.

The employment situation had reached a point where expansion of livestock production might have been difficult. The livestock farm must, in the end, rely on human skill whatever ingenious labour-savings devices are introduced to lighten the drudgery of the job. [Farm News From Britain].

U.S. Agricultural Outlook Conference

The 1972 National Agricultural Outlook Conference has been set for February 22 through 25, at the U.S. Department of Agriculture in Washington, D.C. Central theme of the Conference will be "U.S. Farmers and World Trade." Such topics as expansion of the European Community, changes in monetary relationships, trade relationships with China, and agricultural production in developing countries will be explored in depth and related to prospects for exports of U.S. farm products. [USDA News]

Developing Nations—Use of Space Photography to Deal with Agricultural Problems

An exotic new technology, remote sensing, uses most of the electro-magnetic spectrum from ultra-violet to radio waves. The earth is being examined from satellites and very high altitude aircraft in developing countries to deal with agricultural problems, the FAO reports.

Remote sensing for the most part employs photo-

graphy—black and white, normal false color, and infra-red—alone, or in combination with radar, and spectroscopic analysis. It is proving particularly useful in examining extensive and remote areas of land and sea, and is, therefore, ideally suited to surveying the natural resources, in particular those related to agriculture.

Remote sensing lends itself to forestry surveys, to the detection of land degradation and the spread of plant diseases before they reach advanced stages, to finding out the kinds of crops and their yields in whole regions or countries, and in determining migration patterns of ocean fish and wild game.

Three developing nations that are well along in the utilization or preparation for utilization of remote sensing for agricultural development are India, Mexico and Brazil. They are among the countries present at an FAO meeting on the subject, along with the U.S.A., Canada, France and Italy. The United Nations Outer Space Affairs Division and the European Space Research Organization (ESRO) also do their part. [FAO—Press Release 71/128].

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Machinery Costs in North-Eastern Saskatchewan. L. M. Johnson, Prairie Regional Office, Economics Branch, Canada Department of Agriculture, Torwest Tower, Regina, Saskatchewan. November 1971. Pub. No. 71/14.

AERIS 1971. Agricultural Economics Research Information System. Report No. 2. Economics Branch, Ottawa. October, 1971. Pub. No. 71/13.

Prairie Regional Studies in Economic Geography—No. 7 The Eston-Elrose Region of Saskatchewan. J. W. Channon, H. R. Fast, D. Neil. Prairie Regional Office, Economics Branch, CDA, Torwest Tower, Regina, Saskatchewan. November, 1971. Pub. No. 71/12.

Lists of Titles Pertaining to Remote Sensing and Aerial Photographic Interpretation. L. E. Philpotts, Economics Branch, Ottawa. September, 1971. 44p. (Available in limited supplies).

CANADA DEPARTMENT OF AGRICULTURE PUBLICATIONS

Available from Information Division, CDA, Ottawa, Canada. K1A 0C5.

Research Report—1970. Published by the Research Branch, CDA, Ottawa. 1971. 373p. Organization chart, folded table. Program structure map. Cat. No. A56-1/1970. Free.

Beef Production from the Dairy Herd. R. J. Forrest, Research Station, Agassiz, British Columbia and E. E. Lister, Animal Research Institute, CDA, Ottawa. 1971. 21p. Illus., tables. Cat. No. A53-1456. Free. This publication replaces Pub. No. 1426—*Meat Producing Potential of Dairy Steers and Bulls.*

What you Should Know About Oilseed Crops. Ottawa, 1971. 10p. Pub. No. 1448.

Canadian Wheat Cargoes. Quarterly. 1970-71, 4th quarter, May 1 to July 31. Published by the Grain Research Laboratory, Winnipeg, Manitoba. Polyglot (English, French, German and Spanish). Cat. No. A91-5. Free.

Canadian Durum Cargoes. Quarterly. 1970-71, 4th quarter, May 1 to July 31. Published by the Grain Research Laboratory, Winnipeg, Manitoba. Polyglot (English, French, German and Spanish). Cat. No. A91-6. Free.

GOVERNMENT OF CANADA PUBLICATIONS

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Productivity in the Farm Machinery Industry. Study No. 3 from the Royal Commission on Farm Machinery. Christopher J. Maule, Dept. of Economics, McMaster University, with Donald Martinusen, Royal Commission on Farm Machinery, Ottawa, reprinted, 1971. 64p. Tables. Cat. No. Z1-1966/4-3. Price \$1.00.

Prairie Farm Machinery Co-operative: "The Canadian Co-operative Implements Limited". Study No. 5 from the Royal Commission on Farm Machinery. By Rubin Simkin, Department of Economics, University of Manitoba. Ottawa, reprinted, 1971. 110p. Tables, charts. Cat. No. Z1-1966/4-5. Price \$1.50.

Farm Improvement Loans Act.—Annual Report 1970. Department of Finance. Ottawa, 1971. English text 16p. Tables. Bilingual. Cat. No. F1-4/1970. Free.

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Farm Net Income. Prepared in the Farm Income and Prices Section, Agriculture Division, Ottawa, 1971, 8p. Tables, Cat. No. W1-202/1970. Price 25 cents per copy.

Grain Milling Statistics. Ottawa, 1971. Cat. No. 32-003. Price 10 cents per copy, \$1 per year.

Dairy Products Industry. Prepared in the Manufacturing and Primary Industries Division. Ottawa, 1971. 11p. Tables. Bilingual. (Annual Census of Manufacturers). Formerly: *Dairy Factories*. Cat. No. 32-209/1969. Price 50 cents per copy.

Slaughtering and Meat Processors—1969. Prepared in the Manufacturing and Primary Industries Division. Ottawa, 1971. 9p. Tables. Bilingual. (Annual Census of Manufacturers). Cat. No. 32/221/1969. Price 50 cents per copy.

Poultry Processors—1969. Prepared in the Manufacturing and Primary Industries Division. Ottawa, 1971. 6p. Tables. Bilingual. (Annual Census of Manufacturers). Cat. No. 32-227/1969. Price 50 cents per copy.

Family Food Expenditure in Canada, 1969. Volume 1. Prepared in the Family Expenditure Section, Prices Division. Ottawa, 1971. 208p. Cat. No. 62-531. Price \$2.00. Also available in French.

FAO, OECD AND U.N. PUBLICATIONS

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International Social Development Review. Third issue. United Nations. New York, 1971. 67p. Sales No. E. 71. IV.9. Price \$ (U.S.) 2.00. Unified socio-economic development and planning is the theme of this third issue. The Review contains eight articles ranging from a discussion of the problems of dual society in developing countries to income policy in centrally planned economies, and reflects a fundamental concern of the United Nations with the evolution of a unified approach to development. One of these articles was written by Professor Benjamin Higgins from the University of Montreal, "Planning Allocations for Social Development".

Production Yearbook 1970. Volume 24. FAO. Rome, 1971. 822p. Tables. English, French, Spanish. Cat. No. PP/BO471/7.71/EFS/7100. Price \$10.00.

International Standardization of Fruits and Vegetables—Citrus Fruit. [Ref. CEE AGRI/WP. 1/EUR. STAN. 18] OECD, Paris. 1971. pp. 573-651. Tables. Illus. Cat. No. 51-71-01-1. Price \$3.25.

The Great Experiment. Robin Clarke. A Study prepared for the United Nations Advisory Committee on the Application of Science and Technology to Development (ACAST). Published by the U.N. Centre for Economic and Social Information, New York, 1971. Sales No. E. 71. I. 19. Price \$ (U.S.) 1.00. Eight areas of development selected by ACAST in its World Plan of Action as particularly likely to benefit from existing and new technology, are outlined in detail in the study. They are: natural resources, food and agriculture, industry, transport and communications, housing and urban development, health, scientific education, and population and fertility.

OTHER PUBLICATIONS

Financial Analysis of Expansion Alternatives for Cash Grain Farms in Ontario. P. J. Barry. School of Agricultural Economics and Extension Education, University of Guelph. Guelph, 1971. 67p. Tables. Pub. No. AE/71/6. The purpose of this study was to investigate the influence on a farmer's financial position of farm expansion through investment in land and/or investment in cattle feeding facilities.

Information Requirements for Farm Financial Management: Implications for CANFARM. P. J. Barry. Data Systems. Working paper. School of Agricultural Economics and Extension Education. Guelph, 1971. Pub. No. AE/71/8.

Government Policies and Implications for the Corn Industry. R. G. Marshall. Paper delivered at the Ontario Corn Industry Conference in Ridgetown. School of Agricultural Economics and Extension Education. Guelph, 1971.

An Economic Profile of the Agricultural Industry of Prince Edward Island. G. Ryle, J. Chandler and D. Faulkner. Economics and Statistics Division, P.E.I. Department of Agriculture and Forestry. Charlottetown, 1971. 29p. Fig., Tables. Free.

Agricultural Statistics, 1971. P. E. I. Department of Agriculture and Forestry. Charlottetown, 1971. 70 p. Tables. Free.

Farm Machinery Operating Costs. Schedule of rates for different types of machines in Ontario. W. J. Dillon, Farm Economics, Co-operatives and Statistics Branch, Ontario Department of Agriculture and Food. Toronto, August 1971. 30p. Tables. Bibliography.

Farm Business Summary 1970. Farm Management Division, Economics and Statistics Branch, Saskatchewan Department of Agriculture. Regina, 1971, 33p. Tables.

Canada Grains Council. Annual Report for the year ended March 31, 1971. 200 Chamber of Commerce Building, 177 Lombard Ave., Winnipeg 2, Manitoba. 1971. 18p.

Supplementary Report of the Canadian Wheat Board. Crop year 1969-70. 423 Main Street, Winnipeg 2, Manitoba. 16p. Tables. Copies of this supplementary Report available in French upon request.

1971 Proceedings of the Northeastern Agricultural Economics Council. The University of Massachusetts at Amherst, June 1971. 147p. Contents: Environmental Quality Related to Rural Areas; The Economics of Environmental Quality, the Identification of trade-offs, Property and Environment; Measurement of the Contribution of Agricultural Production and Processing to Environmental Pollution; Alternative Land Use Patterns and Environmental Quality; Local Government Structure and The Provision of Public Services in Rural Communities; "Balanced Growth" — Problem Solution or Problem Dispersion; What is Our Professional Role Relative to Environmental Problems?

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CANADIAN FARM ECONOMICS

INTERNATIONAL TRADE, THE GATT AND CANADIAN AGRICULTURE



G. J. Dobson*

Because Canada's agricultural production capability is far in excess of its relatively small domestic market, exports have traditionally represented about a third of total farm cash receipts. In contrast, in the United States the figure is about 15 percent. Thus, although the USA is the world's largest agricultural exporter with sales in excess of \$7 billion in 1970, in relative terms exports are far more important to Canadian agriculture. In 1970 our farm exports amounted to nearly \$1.7 billion.

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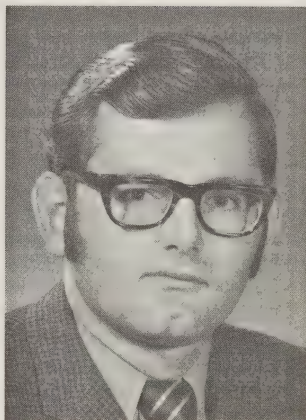
**M. N. Gifford is A/Chief, Trade Policy, Marketing and Trade Division, Economics Branch. This article is based on a paper prepared for the Production and Rural Development Staff Conference, Ontario Department of Agriculture and Food, Toronto, December 7, 1971.

Why has Canadian trade policy been based on multilateralism?

What does GATT mean to Canadian Agriculture?

How do the agricultural policies of other countries affect Canadian farmers?

The following article answers these and other questions by examining Canadian agriculture in relation to the international trading environment.



M. N. Gifford**

This heavy reliance on foreign markets can be both beneficial and detrimental to Canadian agriculture. To the extent that we must export, we have to accept prices prevailing on the world markets, which in many cases tend to be low, particularly in comparison to the levels of certain government-supported prices which exist in many countries. Moreover, among the uncertainties inherent in foreign trade are sudden changes in the import policies of our major customers which cannot be foreseen or controlled. The recent U.S. import surcharge action is an unfortunate example of the uncertainty and resulting instability that external factors can sometimes bring to Canadian agriculture. On the other hand, by participating in a world market we can take advantage of the growth and opportunities for expanded sales—growth which, in most cases, is

far beyond anything which we could contemplate through producing solely for the Canadian market. Therefore, unless we want to think in terms of a vastly reduced agricultural sector producing for a market of only 21 million people, we simply cannot afford to throw up our hands and say that international trade is too tough a league to play in.

Trade is, of course, a two-way street. We sell abroad and we buy from abroad. Traditionally in Canada we have always sold more agricultural products than we have bought, calendar year 1969 being the exception when we exported \$35 million worth less than we imported.¹ However, in 1970 exports strengthened and resulted in a trade surplus of over \$400 million. Agricultural imports in 1970 were \$1.3 billion which compares with the export figure of \$1.7 billion mentioned earlier. However, a large part of our imports (nearly 50 percent) are comprised of products which are not grown in Canada, e.g. cotton, tea, coffee, cocoa, rubber and tropical fruit. If these are deducted from the value of our imports, exports of farm products are over twice as great as our imports of products similar to or competitive with those grown in Canada.

Canada stands to benefit from having access to as many markets of the world as possible on terms and conditions that do not put her at a disadvantage in relation to other exporting countries and allow her goods to compete with domestic production in the importing countries. It is, thus, of the greatest importance that Canada not take action that would prejudice its position with its trading partners. We cannot expect other countries to provide assurance against new obstacles being imposed against our exports unless we are prepared to accept similar obligations.

Having said this, however, it is necessary to recognize that what we hope to gain from an agreement is not always the same as what we have to settle for. In fact, some might say that, notwithstanding import controls in the dairy and grain sectors, Canada's trade policy in agricultural products is too much orientated to the export interests and not enough attention is paid to the impact of imports on Canadian production. Although it is correct to say that, compared to other developed countries, particularly in Western Europe, Canadian

For an analysis of the reasons why Canada became a net agricultural importer for the first time in 1969 see:

Gifford, M. N. "A Net Importer in 1969: Canada's Agricultural Trade in Perspective"; *Canadian Farm Economics*; Vol. 5, No. 4, October 1970.

agriculture has a relatively low normal amount of import protection, it is not true that Canadian agriculture does not have any protection against unfair competition. Low cost or subsidized imports which are injuring Canadian agriculture can be and are offset by additional tariff protection in the form of surtax or anti-dumping duties. The recent application of a surtax on strawberry imports and the present imposition of anti-dumping duties on import of apple juice concentrate indicates clearly that Canadian producers are not expected to compete against unfair or abnormal competition. However, these actions were not applied arbitrarily. They were taken in accordance with our rights and obligations under the General Agreement on Tariffs and Trade (GATT). How then does the GATT fit into the Canadian agricultural trade picture?

The GATT

The chaotic, trade restrictive experience of the 1930's prompted the post-war establishment of an international set of rules to govern the trading conduct of individual countries in a multilateral framework. This set of rules, together with the schedule of tariff rates which have been negotiated, is what is known as the GATT. Canada, because of our major export interests, has been a strong supporter of the principles of this Agreement since its inception in 1948.

The GATT governs the trade conduct of nearly 100 countries. The only important nations not members are certain centrally-planned economies such as the USSR and the Peoples Republic of China although some state trading countries do belong, e.g. Poland, Czechoslovakia, Cuba and Yugoslavia.

The GATT, in essence, is a multilateral trade treaty embodying reciprocal rights and obligations. Although the Agreement is complicated, it contains four fundamental principles aimed at expanding world production and trade:

- (1) Trade should be conducted on the basis of non-discrimination. The cardinal rule of the GATT has long been the most-favoured-nation (MFN) principle — the fundamental obligation that all trading partners should be treated on the basis of equality—that all trade benefits granted to any country shall be extended and generalized to all other participating countries. This principle is at the heart of the multilateral system of trade.
- (2) Protection should be afforded to domestic industries exclusively through the custom's

tariff and not through other restrictive measures, e.g. quotas.

- (3) Inherent throughout the Agreement is the concept of consultation aimed at avoiding damage to the trading interests of member countries.
- (4) The GATT provides a framework within which negotiations can be held for the reduction of tariffs and other barriers to trade and a structure for embodying the results of such negotiations in a legal instrument. Tariff agreements, once negotiated, have all the authority of a contract.

These, in broad outline, are the fundamental elements of the GATT. The sum total of the detailed rules (known as articles) which are built around this basic framework constitute a code which the member countries have agreed upon to govern their trading relationships.¹ Thus, the GATT is not a kind of super trade authority that dictates to Canada what it should do. It would be more accurate to think of the GATT as the chief trade agreement that Canada has with most of its important trading partners. (Although the USSR, for example, does not belong to the GATT bilateral trade agreements between

Canada and state trading countries normally include exchange of MFN treatment).

The following, albeit, oversimplified example provides an idea of how the GATT can affect Canadian agriculture either as an importer or exporter:

Assume country Y has taken emergency import action against commodity X under the provisions of Article XIX of the GATT. Article XIX states, in part, that a country may temporarily suspend tariff concessions or other obligations if "any product is being imported . . . in such increased quantities and under such conditions as to cause or threaten serious injury to domestic producers . . ." The emergency import action could take such form as a temporary quota or a surtax. However, country Y must notify the GATT of its actions and must consult with those countries having a substantial export interest in the commodity. Although compensation is not mandatory the exporting countries affected by the import action could seek compensation for the impairment of a contractual obligation. If the two parties cannot reach agreement after consulting, the exporter can request the GATT for approval to retaliate by suspending substantially equivalent concessions on products of interest to country Y. The GATT would then convene a "panel" composed of disinterested third countries to evaluate the facts of the case. Retaliation could then be permitted or disallowed. In this example most of the elements of the GATT are in play—contractual obligations, notification and consultation. Thus, the interest of both parties are safeguarded. The provisions of Article XIX tend to ensure that importing country Y will not use emergency import measures indiscriminately or frivolously while at the same time allowing it to take such action if the circumstances warrant. Similarly, the exporting country is protected through its right to consult and, if all else fails, to appeal to the GATT for retaliation. In actual practice, the situation rarely goes as far as retaliation. In most cases, the question is resolved through bilateral consultations.

Agriculture and the GATT

Since 1948 there have been six rounds of trade negotiations held under the auspices of the GATT and there is no doubt that world tariff protection and trade restrictive policies have been reduced significantly as a result. However, there has been a marked disparity between the progress made in the industrial sector as opposed to the agricultural sector. Quantitative restrictions and export subsidies

¹The text of the General Agreement contains 38 articles. There are first of all, the articles dealing directly with tariffs—Article I with the most-favoured-nation obligation, and Article II, the basic tariff article incorporating the concessions (i.e. mainly reductions or bindings of import duties) set forth in the schedules annexed to the Agreement—Article III, which deals with internal taxes, is based on the principle that internal taxes shall not be applied so as to protect domestic industry. Article IV and X—known as the technical articles—provide general rules and principles relating to transit trade, to anti-dumping duties, to customs valuation, customs formalities, and marks of origin. Article XI contains the general prohibition of quantitative restrictions. Article XII lays down the conditions under which such restrictions can be used to safeguard the balance of payments. Article XIII provides that quantitative restrictions must be applied without discrimination, certain exceptions to this being set out in Article XIV. Further articles deal with the relationships of the GATT to the International Monetary Fund (XV), subsidies (XVI), State trading (XVII), emergency measures (XIX) and general and security exceptions (XX and XXI). The important consultative provisions for action by members to settle differences arising out of the GATT are contained in Articles XXII and XXIII. Article XXIV sets out, among other things, the rules relating to the establishment of customs unions and free-trade areas. Article XXVII deals with the general principles of tariff negotiation and with the arrangements under which member countries can, by negotiation, modify existing tariff concessions. Other articles deal with technical matters relating to the operation of the Agreement, such as acceptance, accession and withdrawal. Articles XXXVI to XXXVIII relate to the trade of the developing countries.

The text of the General Agreement is published in *Basic Instruments and Selected Documents*, Volume IV, GATT, Geneva, March 1969.

have been virtually eliminated in the industrial sector, but these and other trade distortion devices continue to be the rule rather than the exception in agricultural trade. In agriculture it is generally recognized that tariffs themselves are not, in many cases, the real barrier to trade. There is a wide and sophisticated range of measures such as licensing and certification requirements, variable levy techniques, prior import deposits in addition to the more easily identifiable barriers like import quotas and monopoly purchase operations. Even the Kennedy Round which represented the most recent and the most far reaching of the series of GATT negotiations in the liberalization of world trade was only partially successful in that it failed to deal effectively with the question of non-tariff barriers. The Kennedy Round was the first important attempt to deal with all barriers hindering trade in a particular product, not just the fairly obvious tariff barrier itself. However, the overwhelming tendency for developed countries to support and protect their agricultural sectors for a variety of social, political and economic reasons proved to be too great a stumbling block and the Kennedy Round ended up concentrating on tariff reductions. As a major tariff reduction exercise the Kennedy Round was a success, but solutions to the increasingly important problem of non-tariff distortions remained elusive.

After the completion of the Kennedy Round GATT member countries met in the fall of 1967 to try to agree on a further program for the expansion of trade in the years ahead. Governments recognized that it was important to maintain the liberalization momentum of the Kennedy Round and to lay the groundwork for future undertakings. For agriculture, it was agreed to establish an Agriculture Committee to look at the problems in the agricultural sector, and to explore the opportunities for further trade liberalization.

The GATT Agriculture Committee is currently moving into the third stage of its work program. The first two stages were the assembly of documentation and the identification of the principle problems facing international trade in agricultural products. The third and final stage of its terms of reference is to "seek mutually acceptable solutions to these problems", that is, to establish an agreed framework within which future negotiations can take place.

The current work program of the Agriculture Committee reflects an explicit recognition that import restrictions and export subsidies cannot be divorced from the domestic production and support policies

from which they stem. Therefore, future negotiations aimed at limiting and eventually eliminating non-tariff impediments to trade will, in effect, involve the negotiation of domestic agricultural policies. For example, it is practically inevitable that a high support price that encourages uneconomic domestic production will result in import restrictions; otherwise the supporting country will be supporting the price for the rest of the world. If excess supplies are generated by the high support prices, an export subsidy becomes necessary to bridge the gap between the higher domestic price and the lower world price. Nearly all developed countries have over-utilized the price mechanism to seek certain income objectives for their farm sectors and the result has been a proliferation of quotas, variable levies and export subsidies which threaten to completely disrupt agricultural trade. However, in view of the very real structural and social problems which agricultural change involves for many countries, no sudden and spectacular solutions can realistically be expected. In any particular country domestic considerations probably will continue to have an over-riding influence on agricultural support decisions. Nevertheless, the GATT agricultural work program holds the promise of limiting the adverse effects of such policies on world trade.

While the Agriculture Committee is looking for medium to long-term solutions, the GATT does provide a forum for working toward an alleviation of specific, urgent commodity problems. For example, the GATT has established a Working Group on Dairy Products. One outcome of the work of this group has been the Skim Milk Powder Arrangement which came into effect in 1970. Under this Arrangement signatory countries have agreed not to export skim milk powder at below approximately 11 cents a pound, f.o.b. Before this Agreement came into effect, exporting countries were selling subsidized powder for as little as five cents a pound.

At the present time the GATT objective of providing a stable environment within which international trade can grow is being threatened by two major developments. The first, as already discussed, is the apparent inability of governments to come to grips with the problem of minimizing the conflict between domestic agricultural policies and trade expansion. The need for international co-ordination of national agricultural policies is made even more pressing by the emergence of a second set of factors which could undermine the most-favored-nation principle of the GATT, namely, the expansion of regional

trading blocs which are generating additional preferential tariff arrangements.

The essence of the preferential arrangement is, of course, to provide special duty reductions to member countries which are not available to non-members. While the GATT has laid down specific provisions for the establishment of customs' unions (e.g. the European Economic Community) and free trade areas (e.g. the European Free Trade Area) the question is whether or not many of the subsequent arrangements meet these criteria. In particular, an increasingly important question is whether many of the rapidly growing "associated" arrangements of various countries with the EEC do create a free trade area within the meaning of the GATT provisions, especially the criteria that such arrangements would have to cover substantially all of the trade of the countries concerned and be completed within a reasonable period of time. Many of the countries in North and East Africa now have "special" arrangements with the EEC.

The erosion of the MFN principle is of great concern to Canada in general and Canadian agriculture in particular. The enlargement of the European Economic Community to include Britain, Ireland, Denmark and Norway means that virtually all of Western Europe will shortly be governed by the inward looking Common Agricultural Policy (CAP) of the EEC. Moreover, EEC enlargement, in effect, splits the developed market economies into three major trading bloc—the EEC, the U.S.A. and Japan. All of these markets have domestic populations well in excess of 100 million. Canada is one of the few developed countries which is not a member of a trading bloc and, therefore, does not have preferential access to a market of this size.

Obviously, the trade environment of the 1970's is very different to that which was envisaged when the GATT was drafted back in the late 1940's. Many of the basic philosophies and institutions which were thought to be inviolate in the 1940's are no longer sacred. The principle of fixed exchange rates and the consequential linking of currencies to gold is now seriously questioned. However, the benefits which can accrue from world trade taking place on a MFN basis are still as real as ever. Whether or not they will be fully realized will largely depend on the major trading blocs.

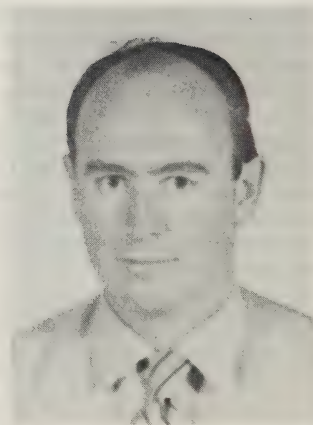
Since agriculture in the developed countries is characterized by wide-spread government intervention it is obvious that solutions to improve the agricultural trade environment require intergovern-

mental commitments on domestic agricultural policies. Recognizing the realities of the world, this in effect means that the US and the enlarged EEC must agree on the basic framework. Other agricultural trading countries such as Canada, Australia and New Zealand can do very little in the absence of positive EEC/USA participation. Unfortunately, at the present time, there is a wide divergence in the basic positions of Western Europe and the United States. On the one hand the U.S. maintains that the objective must be to create an agricultural trade environment which is based on income support divorced from the price mechanism, low tariffs as the only form of import protection and export subsidy prohibitions. Since present EEC policy is not compatible with these objectives it would have to be changed. The EEC on the other hands feels that to move away from its painfully constructed Common Agricultural Policy could destroy the adhesive force which holds the Common Market together. U.S. complaints about the trade inhibiting effects of the CAP variable levy system are countered by EEC complaints about the US quota system. From the third countries' point of view, this continuing confrontation between the two major trading powers is a great source of concern. Until the U.S. and the EEC are prepared to enter into trade negotiations in a significant way, very little progress in halting and eventually rolling back the present distortions in agricultural production and trade can be expected.

It has been said, and with some validity, that world trade is presently at a crossroad. One road leads back to the inward looking, trade disruptive situation of the 1930's and would offset the very considerable advances that have been made in the last 25 years in developing a multilateral trading framework. The other road leads to an outward looking trading environment similar in principle to that envisaged in the late 1940's when the GATT was being drafted, but differing perhaps in detail and institutions. It would lead to progress in resolving underlying trade problems and in moving towards new wide ranging negotiations. Canada, as a major exporter, has been actively working through the GATT to lay the basis for a new round of multilateral trade negotiations in order to come to grips with some of the basic issues. The sudden economic measures taken by the United States in late 1971 to solve its balance of payments problems clearly indicated the critical effect that action by one major trading country can have on the trade of others and made the need for multilateral solutions to trade problems even more important and more urgent.

CANFARM

The Canadian Farm Management Data System



*K. James McKenzie**

INTRODUCTION

In response to economic pressures of the last two decades, Canadian farmers have been forced further and further into utilizing sophisticated business management practices. To help this movement, farm management advisory programs were included in the agricultural extension services throughout the provinces of Canada. These programs were designed to provide information and guidance to farmers in the use of such management tools as financial planning, business analysis, partial budgeting, calculation of least-cost rations, cash flow projections, procedures for the selection of improved livestock, and many others. Businesses and agencies working with farmers have found themselves using similar tools to assess the profitability, and hence the

market potential, of the products and services they sell to, or buy from, farmers. Credit agencies have been particularly forward-looking in introducing financial planning and farm appraisal techniques to assess loan worthiness. The successful utilization of many of these tools often hinges on the availability of relevant, accurate, and timely data. Furthermore, a wide variety of tools (e.g. linear programming, simulation) which are not currently being used, appear likely to become practical in the near future if good data are available.

However, the task of obtaining such data is usually very expensive, time-consuming, and frustrating when it must be approached on an individual basis. Each farmer has only a very narrow range of circumstances on which to take observations—namely, his own farm at various points in time. He is usually not sufficiently well-trained to readily organize procedures for obtaining useful data, either physical or financial. A particular farm supplier who is interested in assessing the value of prepared feeds or fertilizers to farmers in his area is often in a similar position. Credit agencies also find the cost

*K. James McKenzie is the chief of the Farm Planning Section of CANFARM. He joined in its early-beginnings in 1969. This is the first in a series of articles on CANFARM. Subsequent articles will discuss the Farm Records system, the Farm Business Analysis system and several of CANFARM's Farm Planning Services.

of obtaining good data on farming operations to be quite high.

In the past, this problem has been handled by farmers, extension workers, and agri-business in several ways. Firstly, they have made extensive use of experimental data produced by research agencies. Secondly, they have established and participated in regional farm record-keeping projects. Thirdly, a variety of systems for maintaining livestock (e.g. Dairy Herd Improvement Association) and crops (e.g. Crop Improvement Association) records have been established. All of these approaches have proved to be quite useful, although they exhibited several weaknesses. Experimental data has often proved unreliable for farm conditions. Regional record-keeping projects have often been too narrow in scope, or produced results which were either too highly aggregated or too inaccurate to be useful in producing meaningful analyses. Decisions made on the basis of physical production data alone have sometimes been unwise from an economic point of view.

THE ORIGIN OF CANFARM

The advent of electronic data processing (E.D.P.) has opened up new avenues in the transmission, collection, storing, and manipulation of data. Computers have created the possibility of more timely and detailed reports. They permit the storing of large volumes of both physical and financial data for future uses such as budgeting, cash flow analysis, farm management research, comparative analysis, and genetic selection. They also permit transmitting information long distances, in both a rapid and inexpensive fashion.

Experimental work and production records, such as D.H.I.A., will still be important data sources for farm managers. Some of these have been computerized, in whole or in part, for some time. Combining these data with data from farm records could provide a comprehensive farm management information system for individual farmers. In response, agriculturalists in several parts of Canada began to develop electronic mail-in farm accounting programs in the early 1960's.

However, the electronic mail-in record systems were only partially developed by the end of 1965 due to staff shortages and inadequate financing. Nevertheless, economies of size and the desire for data compatability, would make a single mail-in system beneficial to all users in Canada. A single national

system would facilitate direct comparison and utilization of data from many regions and types of farms. It was obvious also that no one institution had both qualified professional staff and the rather substantial funds required to develop a full-scale system, and that economies could be realized by working together.

With these objectives in mind, workers on systems being developed at the Universities of Guelph and Saskatchewan, the Farm Credit Corporation (F.C.C.) and the Economics Branch of the Canada Department of Agriculture met in Guelph in August, 1965, and asked the Agricultural Economics Research Council of Canada (AERCC) to sponsor the development of a national mail-in farm record system. The AERCC sponsored two voluntary committees, a National Co-ordinating Committee, to be concerned with problems of finances and policies for using and operating such a system, and a Working Committee to get the technical job done. Universities, and provincial and federal departments of agriculture were represented on these committees.

The National Co-ordinating Committee sought financial assistance from the Canada Department of Agriculture (CDA). The proposal was accepted by the Department, which since then has provided most of the resources for the development of the system. Other funds, professional staff and computer time have been contributed by the AERCC, the Universities of Guelph, Saskatchewan and Laval, the Farm Credit Corporation, and various provincial departments of agriculture. As a result of the efforts of the National Co-ordinating Committee, CANFARM—The Canadian Farm Management Data System—came into being.

THE INSTITUTIONAL FRAMEWORK FOR CANFARM

CANFARM's programs are now being developed and implemented on a national basis. They require the resources of both federal and provincial governments, universities, Farm Credit Corporation, agri-business firms, farm organizations, and farmers. The following relationships have been established in order to co-ordinate these resources.

Policy

At the policy level CANFARM comes under the jurisdiction of the Canadian Agricultural Services Co-ordinating Committee (CASCC). This Committee is composed of the federal Deputy Minister of

The Institutional Framework for CANFARM

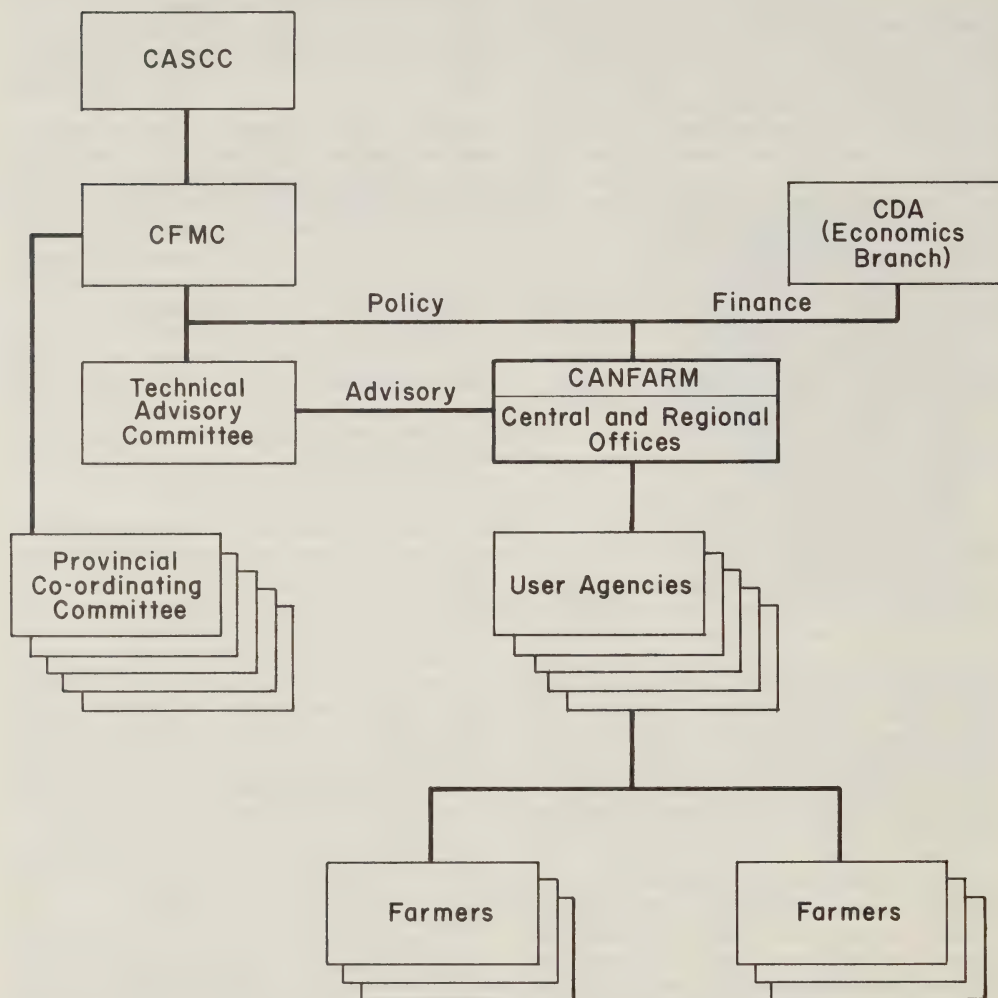


FIGURE 1

Agriculture (Chairman), the ten provincial Deputy Ministers of Agriculture, the ten Deans and Principals of Faculties and Colleges of Agriculture and Veterinary Medicine, the Directors-General of the CDA Branches, the federal Assistant Deputy Ministers of Agriculture, the Director of Biosciences of the National Research Council, the Director of the Agricultural Research Institute of Ontario, and the President of the Quebec Agricultural Research Council.

The CASCC member institutions concerned with farm management have each appointed a member to the Canada Farm Management Committee in order to co-ordinate and foster research, education, training, and extension in farm management across Canada. Included in the responsibilities of this committee are those of advising CASCC on policy matters related to CANFARM, and of guiding the development and implementation of CANFARM programs.

"User Agencies"

At the operational level, provincial departments of agriculture, universities, and the Farm Credit Corporation have been designated by CFMC as "User Agencies". They are responsible for:

- (i) contacting farmers interested in using CANFARM's services.
- (ii) instructing them in recording the necessary physical and financial transactions, and other essential data.
- (iii) reviewing data submitted by the farmers for completeness and accuracy.
- (iv) assisting farmers in interpreting and using their reports for assessing current operations, detecting problems, isolating alternatives and making decisions.

CDA

Also at the operational level, the Economics Branch of the Canada Department of Agriculture is responsible for:

- (i) the establishment and operation of CANFARM regional data preparation centres to receive the source documents and prepare the data for the computer (Centres will be established in each province as required by either volume or service).
- (ii) the computer processing of data to produce the farmers' monthly and annual reports, copies of which will be provided to the farmer, the field contact men and the User Agency's central office.
- (iii) provide User Agencies with their data upon request (magnetic tape or printed).
- (iv) the development, testing and operation of each of CANFARM's phases and programs.
- (v) the preparation of training and explanatory materials on each of the CANFARM programs and participation in the training activities to assure national consistency and comparability.

The Technical Advisory Committee

In addition, a Technical Advisory Committee composed of farm management specialists representing User Agencies from different areas across Canada has been appointed by CFMC. The functions of this Committee are:

- (i) to consider proposals prepared by the CANFARM (Economics Branch) staff based on modifications and innovations suggested by users of CANFARM.

- (ii) to develop standardized concepts proposed by CANFARM staff and to provide a "sounding board" for the development of future phases of the system.

Provincial Co-ordinating Committee

Provincial Co-ordinating Committees have also been formed with the following responsibilities:

- (i) to make recommendations to the Provincial Minister of Agriculture with respect to the affiliated users of CANFARM programs in the Province.
- (ii) to provide adequate training sessions for staff of affiliated agencies using CANFARM programs in the provinces.
- (iii) to assist affiliated agencies using CANFARM's programs when problems are encountered.

An overview of the relationships between these various bodies is presented in Figure 1.

CANFARM PROGRAMS

If Canadian farmers are to be well-equipped to resolve their business management problems, they must have access to assistance in four key areas—record keeping, problem detecting, isolating alternatives, and decision-making. Improvements in the farmer's accounting system will enable him to accurately measure the physical and financial status of his existing operation as well as to meet institutional requirements. Improvements in his ability to analyze these measures of his existing operation will permit him to pinpoint problem areas quickly. Increased availability of relevant information on prices and technical production relationships will enable him to set down alternative courses of action for resolving such problems. Increased availability of modern business management techniques will allow him to quickly decide which is the most appropriate of these alternative courses of action for him to follow.

Thus, CANFARM has established four major programs, each of which is designed to contribute a particular way to the farmer's management needs. A Farm Records Program began operation in 1969. About 8,000 Canadian farmers are expected to participate in this program in 1972. A Farm Business Analysis Program will go into operation for the first time early in 1972. A program to develop a Data Base for production and price information is just beginning. A Farm Planning Program has already

The Daily Working Relationship Between CANFARM (Economics Branch) and User Agencies and Affiliates

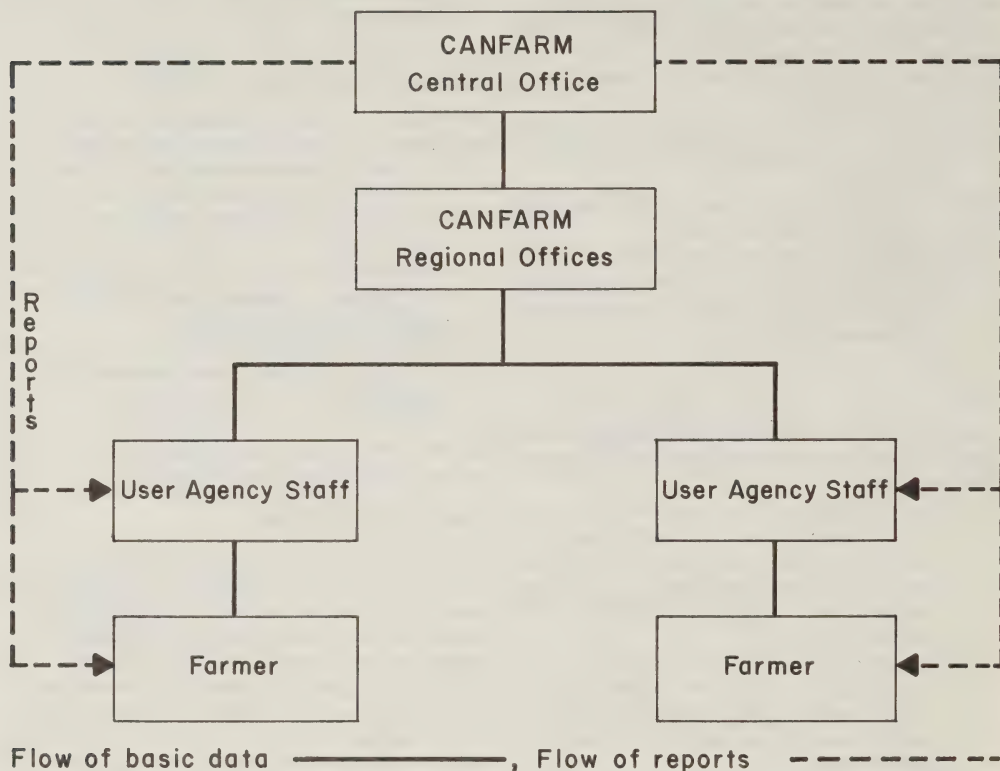


FIGURE 2

begun, and several planning services will be tested in 1972 and 1973. Figure 2 illustrates how farmers submit basic data and receive reports under these programs.

The Farm Records Program must meet several basic criteria to be successful on a national basis. It must be acceptable to farmers, or they will not use it—certainly not on a continuing or large scale basis. To be acceptable, and at the same time meet both the specific needs of individual farmers and the diverse needs of the many farmers in Canada. It must be complete without being complex, flexible without being unwieldy. To accomplish this it has been necessary to construct a system with many optional features. Farmers with little accounting experience must be able to enroll in a relatively simple system and progress to a more sophisticated

one as their needs and abilities develop. Others may initially enroll at a level where they can use the most sophisticated features to full advantage.

Briefly, a good farm accounting system should provide the farmer with a clear-cut description of such information as:

- (i) the revenue, expenses, and net income for the accounting period.
- (ii) the assets, liabilities, and owner's equity in the farm business at selected points in time.
- (iii) the contribution of his various livestock and crop enterprises to overhead and profit.
- (iv) his per unit costs of producing each of his products.
- (v) his costs of operating and maintaining machinery and buildings
- (vi) salaries, deductions, and monies submitted

for Canada Pension Plan, Workmen's Compensation, and Unemployment Insurance.

The Farm Business Analysis Program is designed to enable farmers to evaluate the performance of their businesses with a view to diagnosing problem areas. Evaluation implies that there is some standard of achievement against which the business can be compared. Currently, the standards being used in this program are the levels of performance being achieved by groups of similar farms, in terms of type of enterprise and level of total resources. Others are selected because they are different in resource use. This lets the farmer see how he stacks up against other producers in his line of endeavour. However, as agricultural technology progresses, other standards must be developed in order to cope with changing conditions and the uniqueness of particular modes of production. All farmers who participate in the Farm Records program can also participate in the Farm Business Analysis program through their contact agents. However, the data used to establish the above-mentioned standards of performance is taken from only those farms which, according to their contact agents, have kept a complete and accurate set of records for the year.

Through this program, the Canadian farmer should be able to assess whether or not:

- (i) his net income is comparable to that of similar farms with equivalent resource complements.
- (ii) his returns to labor and capital might be increased by changing his size or type of endeavour.
- (iii) his unit costs of production are higher than they might be if some other production techniques were used.
- (iv) he is taking advantage of market conditions to get the best prices for his product.

The Data Base Program is intended to provide selected information in a form suitable for farm management research and extension programs. While not all of the farmers enrolled in the Farm Records program keep detailed cost records, most of them will record some information about their farm business which can be usefully retrieved for purposes other than producing reports on their farms alone. One of these is the Farm Business Analysis program mentioned above. Farm management research is another. Some of this data can be used in the formulation of a farm planning data base which will aid extension and lending agency personnel in their work with individual farms. To complement this data, information on product

prices, climate, nutrition, machinery capabilities and so on can be obtained from other sources and stored on file by CANFARM in a fashion suitable for ready access. Retrieval systems can then be developed to allow relevant components of this information to be quickly obtained when, and in the form in which it may be needed for farm management work. The Data Base Program is currently in the planning stages. It will not be operational until 1974 or 1975.

From the Data Base, the farmer should be able to determine such things as:

- (i) the short, intermediate, and long-term capital requirements of a proposed expansion.
- (ii) the prices which he can expect for his products when these are placed on the market.
- (iii) the levels of resources (e.g. seed, feed, fertilizer) required to produce products which he has never produced before.
- (iv) the likelihood of declining markets, poor weather conditions, or other factors which might adversely affect his plans.

The Farm Planning Program will provide services to assist individual farmers in predicting the results of some of the alternative courses of action open to them and facilitate their making objective choices among such alternatives. Farm Planning will be approached on an individual basis because levels of physical, financial, and managerial resources, which are key considerations in making decisions, vary from farm to farm. Furthermore, preferences for income, risk, extra work, and the intangible aspects of country living must also be considered in making decisions and these too vary among farmers. Thus, the farmer must specify his particular resource levels and preferences in order so that the results of computerized farm planning to be useful to him. CANFARM will enable him, by means of the computer, to quickly calculate the results of proposed plans and select the best of these.

The services offered in the Farm Planning program will help the farmer:

- (i) construct a projected cash flow statement.
- (ii) decide whether to trade his tractor or keep it another year.
- (iii) compare the extra cost of a larger machine with its added value when it will only be needed one year in four.
- (iv) select the best cropping program where land, labor and operating capital are all in fixed supply.
- (v) determine the least cost ration to feed his livestock to obtain a given level of performance.

INTERNATIONAL DAIRY SITUATION AND OUTLOOK

Milk production in 1971 in OECD countries showed little change for the third year in succession.¹ Demand for cheese and, to a lesser extent, for whole milk powder continued to expand and the higher output of these products in most countries diverted milk from butter manufacturing. As a consequence, a very sharp price rise for butter occurred in the United Kingdom, which imports about 85 percent of its domestic requirements. On the London Provision Exchange in mid-December, 1971, the price of New Zealand Finest Grade butter was £530 per ton (59 Canadian cents per pound) compared to £330 (36 Canadian cents per pound) a year earlier. By January 10, 1972, the price of New Zealand butter rose to £573 per ton. Similar increases were reported for cheese prices.

Milk production started to move upward from year-earlier levels in several countries during the closing months of 1971 and this trend has continued into 1972. The mild autumn and early winter over much of northern Europe contributed to the higher milk production. Higher prices and expectations of higher prices in countries on joining the EEC were likely also contributing factors.

The large butter stocks of the late 1960's have been disposed of and supplies are now much smaller in world markets. Stocks in the European Economic Community at the beginning of 1972, where the decline in stocks has been most marked, were about 44 million pounds less than a year earlier. Fears that the much reduced EEC butter stock level would be insufficient for domestic requirements were not realized and the EEC's agricultural fund is again operative (effective January 27, 1972) for Community exports of butter. Export refunds were stopped in April 1971, when the Community was threatened with shortages.

¹Reporting countries of the OECD (Organization for Economic Cooperation and Development) include Western Europe, the United States, Canada, Japan and New Zealand.

*Miss V. McCormick is the Dairy Outlook economist in the Marketing & Trade Division. Readers are referred to "Consumption of Milk, Dairy Products & Margarine", by the author and in this issue.

*Veronica
McCormick**



Butter stocks in the United Kingdom at the beginning of January were slightly above a year ago. Shipments from Australia were much below usual in December but this was compensated for by arrivals from the United States. In 1971, the United States sold 128 million pounds of butter to commercial exporters for shipment overseas, primarily to Great Britain, after being out of the commercial export market since 1966. These export sales reduced the volume of support stocks in the United States at the beginning of 1972 to slightly below year-earlier levels.

Stocks of skim milk powder in the EEC have been sharply reduced and the Community has been taxing the export of skim milk powder rather than giving export subsidies.

It is not expected that there will be any widespread increase in milk production in OECD countries in the early months of 1972. The factors which have led to the stabilizing of milk production are likely still operating in many countries. These include cow slaughtering programs, grants for withholding whole milk from the market for fattening calves, and levies on surplus production. (The system of grants for cow slaughtering, which was in effect in the EEC, was discontinued in June, 1971). Demand for cheese should continue strong, and production should increase further in 1972.

It is possible that the high price of skim powder, together with the strong butter market, may divert milk from these products and away from cheese in some countries.

FARMING IN THE CYPRESS HILLS AREA OF SASKATCHEWAN

a description and financial analysis

On good land, both cattle and grain are profitable enterprises.

On poor land, cattle raising can earn profits while grain growing loses money.



*Max Sorboe**

The Cypress Hills area is a dry, rolling region in the southwestern corner of Saskatchewan and extends westward into Alberta. Most of the area is in the Brown Soil Zone and native cover consists chiefly of blue grass associated with common spear grass, blue joint (western wheat grass), June grass and Sandburg's blue grass.¹ Trees are absent except in certain moist, sheltered locations such as stream valleys.

Most economic activity in the area is generated by two farming enterprises, beef cattle and grain. The region is arid and varies greatly in soil composition and topography. Consequently, farms differ in size. At higher levels, in the Cypress Hills, it is too dry for grain production, hence cattle ranches predominate. Extending outward from the Hills the land becomes more level and productive; cattle numbers decrease and grain farms are interspersed with mixed cattle-grain farms.

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This article is part of a larger study presently under way at the Regina office. The purpose of the study is basically, two-fold; (a) to collect information on pasture, feeds and feeding practices on grain-cattle farms to establish input-output co-efficients for interdisciplinary research and extension work; (b) to analyze the trend in grain-cattle farm structure and to determine the economic effects of shifts in the use of arable land.

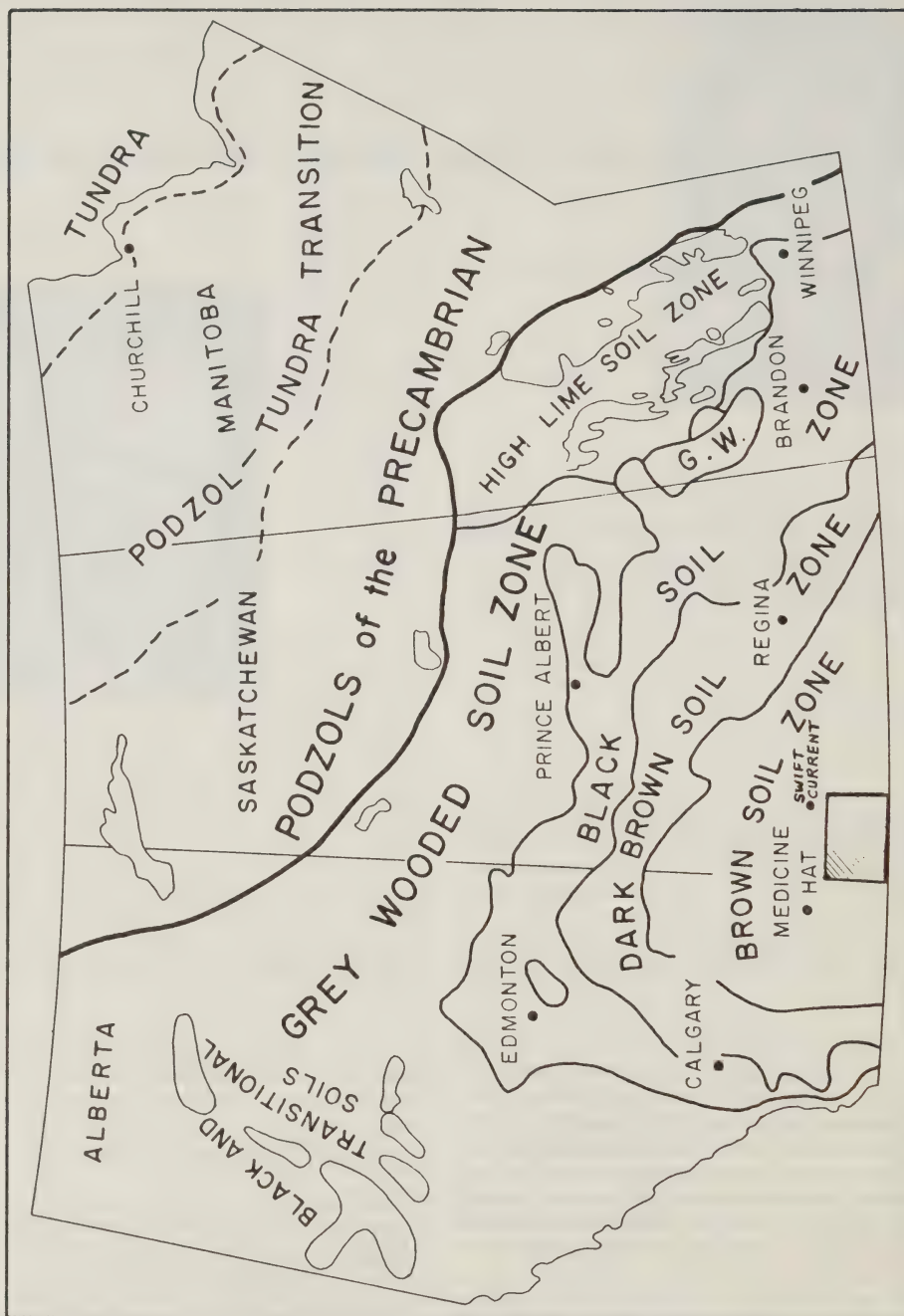
The objective of this paper is to describe farm practices in the area and to analyze some financial aspects of the commercial grain-cattle farms.

Sampling Procedure

Fifteen geographical strata were identified in Census Division 4, which were subsequently divided into segments that would be expected, on an average, to contain the headquarters of three farms. Within each strata five percent of the segments were randomly selected with equal probability and without replacement.²

GENERALIZED SOIL ZONES OF THE PRAIRIE PROVINCES

Showing Survey Area (Census Division 4)



Source: J.G. MacKenzie, Economics of Grain-Fallow Rotations and Fertilizer Use in the Prairie Provinces, Economics Branch, Canada Department of Agriculture, 68-9.

TABLE 1—NUMBER OF FARMS AND CHARACTERISTICS OF FARM UNITS IN CENSUS DIVISION 4, SASKATCHEWAN, 1966¹

	Census Division 4 Saskatchewan
Total Number of Farms.....	2,630 —percent of all farms—
Farm Size (Improved Acres)	
Less than 400.....	28
400 to 1,119.....	51
1,120 or more.....	21
Farm Size (Number of Cattle)	
No Cattle.....	29
1 to 7.....	5
8 to 32.....	16
33 to 177.....	40
178 or more.....	10

¹ Source: 1966 Census of Canada.

All farmers whose farm headquarters were located in a sample segment were contacted. Detailed information was obtained from operators of farms with 33 to 177 head of cattle and from 400 to 1,119 improved acres. These limits were objectively derived from the 1966 Census of Canada data to include only commercial, family-operated grain-

cattle farms (Table 1). Approximately 30 percent of the farms qualified for inclusion in the study.

Method of Analysis

The 44 farms were classified into four groups as follows.

- less than 76 cattle units,³ and less than 883 improved acres (average cattle—average grain, AC-AG);
- less than 76 cattle units and more than 883 improved acres (average cattle—high grain, AC-HG);
- more than 76 cattle units and less than 883 improved acres (high cattle—average grain, HC-AG);
- more than 76 cattle units and more than 883 improved acres (high cattle—high grain, HC-HG).⁴

FARM PRACTICES

Land Use and Crop Yields

Grain land in the study year was farmed by a systematic one crop-summerfallow rotation. (Table 2). Stubble lands were infrequently seeded for cash grain cropping, but a number of farmers reported seeding stubble acreages for grain hay and pasture.

TABLE 2—AVERAGE LAND USE ON GROUPS OF GRAIN-CATTLE FARMS, CENSUS DIVISION 4, SASKATCHEWAN, 1970

	Farm Groups							
	AC — AG		AC — HG		HC — AG		HC — HG	
	Acres	Per- cent	Acres	Per- cent	Acres	Per- cent	Acres	Per- cent
Number of Farms.....	16		9		11		8	
Improved Land ¹								
Wheat.....	151.2	29.9	481.3	36.4	143.4	18.7	475.0	26.8
Barley.....	32.3	6.4	70.1	5.3	22.0	2.9	85.6	4.8
Oats.....	4.1	0.8	36.4	2.7	13.0	1.7	93.1	5.3
Other Crop.....	12.7	2.5	12.7	1.0	34.5	4.5	53.1	3.0
Summerfallow.....	201.1	39.7	637.1	48.1	258.0	33.7	803.1	45.3
Grain Hay.....	37.3	7.4	34.3	2.6	81.8	10.7	28.8	1.6
Perennial Hay.....	11.5	2.3	25.8	1.9	62.9	8.2	52.3	3.0
Grain Pasture.....	11.9	2.3	26.6	2.0	13.2	1.7	—	—
Perennial Seeded Pasture.....	44.3	8.7	1.1	0.1	137.4	17.9	181.9	10.2
TOTAL IMPROVED LAND.....	506.4	100.0	1,325.4	100.0	766.2	100.0	1,772.9	100.0
Unimproved Land:								
Owned Grazing.....	321.1		254.8		592.0		686.2	
Rented Grazing.....	390.5		206.6		1,125.5		663.4	
TOTAL LAND OPERATED ²	1,218.0		1,786.8		2,483.7		3,122.5	

¹ Includes owned and rented improved land.

² Does not include community grazing lands.

The cash crops, in order of importance, were wheat, barley, oats, rye, flax and sunflower.

Cash grain crops and summerfallow occupied nearly 82 percent of the total improved land. The balance was used for hay and pasture. However, there was a large variation among groups of farms—dependent on and consistent with the relative importance of the cattle enterprise. The HC—AG farmers used 38.5 percent of their improved land for hay and pasture but the AC—HG farmers used only 6.6 percent of their improved land for forage.

Summer grazing was provided mainly by privately owned and leased land. The ratio of owned to leased rangeland for the HC—AG group was about 1:2 and for the other groups it tended toward a 1:1 ratio. In many instances, grazing was provided on community pastures. Several of the patrons of these pastures implied that the community pasture quotas set the limit on the size of their cattle herd.

Yields per acre were much higher on the large grain farms than on the average grain farms (Table 3). The average yield of perennial hay on non-irrigated land, on an average for all farms, was nearly the same as for oat hay—about one ton per acre. Only minor differences in crop management practices were recorded. Commercial fertilizers were used infrequently, generally on an experimental basis and with indeterminate results.

Haying Practices

Perennial hay and pasture establishment usually followed a grain-summerfallow rotation and the grass mixture was generally seeded in the spring with a cover crop of oats. Most mixtures included alfalfa, brome and crested wheat grass. Russian wild rye was receiving attention and two operators

had recently established pasture acreages with this grass in the seed mix. In the first year, only the cover crop was harvested. A light crop of hay was taken off some fields in the second year but generally it was not until the third year that a full hay crop was harvested.

Harvesting was done by swathing the grain hay and about one-half of the perennial hay. The rest of the hay was mowed and raked. The hay was then baled and hauled by truck or trailer to the winter feed yards where it was stacked, with rare exception, in the open.

Although most farmers in each group had unimproved land that could have been seeded to tame grass, there was some reluctance to do so for the following expressed reasons:

1. Establishment of tame grasses on marginal lands was risky and often a failure.
2. There would be a loss of natural grazing or native hay from the best of the remaining uncultivated land.
3. The additional forage yield from these lands would not be sufficient to defray the costs of establishing and maintaining the hay or pasture stands.
4. Grain hay and straw were cheaper than perennial hay to produce and, as sources of additional forage, their yields were more predictable and their acreages could be adjusted to meet requirements.⁵

Cattle Marketing and Management Practices

Farmers in the study area sold most of their cattle through local public auctions. Some were sold by commission agents to distant buyers and others were purchased directly from the operator by neigh-

TABLE 3—AVERAGE YIELDS OF HAY AND GRAIN ON GROUPS OF GRAIN-CATTLE FARMS, CENSUS DIVISION 4, SASKATCHEWAN, 1970

Farm Group	Number of Farms	Kind of Hay			Kind of Grain			
		Grain	Irrigated Tame	Non-Irrigated Tame	Durum	Wheat	Barley	Oats
		—tons per acre—			—bushels per acre—			
AC — AG.....	16	.99	1.44	.82	16.9	17.9	21.6	19.0
AC — HG.....	9	1.43	3.00	.97	30.0	23.9	43.1	54.3
HC — AG.....	11	.81	2.18	1.00	27.8	15.8	20.6	34.1
HC — HG.....	8	1.39	2.33	1.00	29.2	22.0	38.2	49.3
ALL FARMS.....	44	1.01	2.12	1.00	27.3	20.9	33.6	47.3

boring farmers. Three basic practices were followed in marketing cattle.

- (a) selling calves in October, November and December—cow-calf operations,
- (b) selling yearlings between February and July—cow-yearling operations,
- (c) marketing a mixture of feeder calves and feeder or semi-finished yearlings—a combination cow-calf, cow-yearling operation.

The average grain groups (AC—AG and HC—AG) were mainly cow-calf operations with cattle marketing averages of 71 and 74 percent calves, 16 and 15 percent steers and heifers, and 13 and 11 percent cull cows and bulls, respectively. Average distribution of cattle sales for the high grain groups (AC—HG and HC—HG) were 43 and 48 percent calves, 46 and 46 percent steers and heifers, and 11 and 6 percent culls, respectively. This strongly indicates that the cattle management system depends more on grain acreage than on cattle numbers.

No significance was attached to the differences in the average weights of calves sold by the various groups of farmers. Selling weights of calves were 458, 447, 423 and 443 pounds, respectively, in group order. However, the average market weights of yearling stock were 635, 732, 677 and 775 pounds per animal, reflecting heavier grain feeding on high grain acreage farms. Only five of the smaller grain producers "warmed-up" or semi-finished their yearling stock. In contrast, eight large grain farmers fed their yearlings intensively over a long period of time.

Hereford cattle predominated in the area and most of the operators used Hereford bulls. However, mixed herds of Hereford, Angus and Shorthorn were common and crossbreeding of these types was being done by several operators. A common practice was to breed heifers to an Angus bull to avoid calving

problems. Some Charolais-Hereford stock and Charolais bulls were also used and three operators had Galloway cows.

Calving starts about mid-March and extends through May, the peak period being April. Castration, de-horning and branding are done in May, June and July. Most of the cattle are vaccinated for blackleg, septicemia and malignant edema during the summer and spraying for warbles and other parasites is done as required. Calves are weaned in the fall, usually in October or shortly after the "roundup". The breeding herd is culled after roundup and during the winter. Replacement heifers are selected from the operator's own herd or purchased at local sales. Bulls are usually obtained at local auctions or directly from a breeder.

Cows and replacement long-yearling heifers are bred during the latter half of June and the first part of July. Breeding takes place in breeding pastures and continues on the range. Many of the smaller herds are serviced by government bulls on community pastures.

Feed Supply and Feeding Practices

Maintaining an adequate winter feed supply constitutes a major problem for cattle producers in the study area. Perennial hay yields and the length of the winter feeding period vary greatly, depending on the weather. Farmers try to carry over at least one-quarter ton of hay per animal unit.

The cattle ate 1.6 tons of forage per animal unit during the winter feeding period. The roughage was 44 percent grass hay, 29 percent grain hay and 27 percent straw on an average for all farms. More straw, chaff and grain were fed per animal unit by farmers with large grain acreages (Table 4).

TABLE 4—AMOUNT AND KIND OF ROUGHAGE AND GRAIN USED ON GROUPS OF GRAIN-CATTLE FARMS CENSUS DIVISION 4, SASKATCHEWAN, 1970

Farm Group	Number of Farms	Average Cattle (A.U.'s)	Hay and Forage				Grain	
			Tame Hay	Native Hay	Grain Hay	Straw and Chaff	Home Produced	Purchased
—tons per animal unit—								
AC — AG.....	16	50.2	.33	.31	.52	.35	.24	.01
AC — HG.....	9	51.8	.44	.22	.55	.84	.63	—
HC — AG.....	11	108.9	.64	.05	.55	.32	.10	.02
HC — HG.....	8	110.0	.71	.14	.25	.46	.39	.02
All Farms.....	44	76.1	.55	.16	.46	.44	.27	.02

Labor Supply

About 73 percent of the total labor requirement was supplied by the operator. Unpaid family members contributed 24 percent and casual hired help, three percent. As farms increased in size the operator's time contribution decreased relative to that of unpaid family members.

FINANCIAL ANALYSIS

Liabilities

Average capital liabilities by farm groups were; AC—AG \$4,408, AC—HG \$10,649, HC—AG \$11,277 and HC—HG \$15,238. Calculated as a proportion of total investment, these debts averaged 10 percent of assets for all groups, based on land

values of \$50.00 per improved acre and \$10.00 per unimproved acre.

The most important source of loan funds was the Farm Credit Corporation. Second in importance were bank loans secured through the Family Farm Improvement Loan Administration. Private agencies including banks, credit unions and machinery companies supplied loans of shorter duration. Loan capital was used mainly for the purchase of additional land and secondly for machinery replacement.

Farm Income and Expenses

Larger farms generated higher incomes with less than proportionate increases in total farm costs.

TABLE 5—SUMMARY OF PHYSICAL DATA, CAPITAL INVESTMENT AND OPERATING STATEMENT OF GROUPS OF GRAIN-CATTLE FARMS, CENSUS DIVISION 4, SASKATCHEWAN, 1970

	Farm Group			
	AC — AG	AC — HG	HC — AG	HC — HG
Number of Farms.....	16	9	11	8
Number of Cattle Animal Units.....	50.2	51.8	108.9	110.0
Improved Acres to Cattle Enterprise.....	105	88	295	263
Improved Acres to Grain Enterprise.....	401	1,238	471	1,510
	—dollars per farm—			
Capital Investment				
Land.....	28,531	68,820	44,232	95,506
Buildings.....	11,185	18,262	15,872	20,976
Machinery.....	11,026	36,823	21,824	35,800
Livestock and supplies.....	13,937	16,986	29,759	31,962
Total Capital.....	64,679	140,891	111,687	184,244
Cattle Enterprise Income.....	5,784	6,828	12,259	14,603
Grain Enterprise Income.....	4,264	19,289	5,053	19,371
Total Farm Income.....	10,048	26,117	17,312	33,974
Land, Building and Fence Expense.....	983	1,479	1,589	2,021
Machinery Operating Costs.....	1,718	2,543	2,363	3,025
Custom Work.....	554	79	228	301
Hired Labor.....	68	236	326	104
Value of Feed Grain and Forage Used.....	770	1,968	1,097	2,432
Crop Expenses.....	164	523	333	681
Livestock Expenses.....	240	416	321	557
Other Cash Expenses.....	451	579	506	702
Total Cash Expenses.....	4,948	7,823	6,765	9,823
Machinery Depreciation.....	1,463	4,295	2,874	4,496
Building Depreciation.....	501	770	740	969
Total Farm Expense.....	6,912	12,888	10,389	15,288
Family Farm Income.....	3,136	13,229	6,923	18,686
Less Value of Unpaid Labor.....	891	1,911	1,230	3,056
Operator and Capital Income.....	2,245	11,318	5,693	15,630
Less Interest (6½%) on Investment.....	4,204	9,158	7,260	11,976
Operator's Labor Income.....	-1,959	2,160	-1,567	3,654
	—dollars per \$100 capital—			
Operator and Capital Income.....	3.47	8.03	5.10	8.48
Operator's Labor Income.....	-3.03	1.53	-1.40	1.98

Consequently, increasing returns to scale were reflected in the average net incomes of the operators for their labor and capital (Table 5). The sum of cash expenses, depreciation and the value of unpaid labor were a lower percentage of gross farm income for the high grain groups (57 and 54 percent, respectively) than for the corresponding average grain groups (78 and 67 percent, respectively). Average grain groups had negative incomes for labor and management but high grain groups were fully compensated for the use of capital and retained positive incomes for their efforts.

Cattle Enterprise Income and Expenses

There was a large difference in family farm income per animal unit among the four groups. It ranged from \$44.17 for the AC—AG group to \$75.29 for the HC—HG group (Table 6). The larger farms were more efficient, spreading fixed costs over more cattle.

The family farm income per animal unit was lower for the average grain group than for the corresponding high grain group. Two factors influencing these results were noted.

- (a) Average grain groups had lower yields of forage per acre than the high grain groups.
- (b) Operating statements for cattle enterprises show smaller gross receipts per cattle unit on the average grain groups (\$115.13 and \$112.57) than on the high grain groups (\$131.81 and \$132.74). Higher returns were received because the high grain group kept their calves longer and fed them to heavier weights.

The family farm income per animal unit was larger for the high cattle group than the corresponding average cattle group—\$55.63 versus \$44.17 and \$75.29 versus \$57.45. This was due to economies of size in:

TABLE 6—SUMMARY OF CATTLE ENTERPRISE INPUT-OUTPUT DATA ON GROUPS OF GRAIN-CATTLE FARMS, CENSUS DIVISION 4, SASKATCHEWAN, 1970

	Cattle Enterprise Group			
	AC — AG	AC — HG	HC — AG	HC — HG
Number of Farms.....	16	9	11	8
Number of Cattle Units Per Farm.....	50.2	51.8	108.9	110.0
Improved Acres to Cattle Enterprise.....	105	88	295	263
Unimproved Acres to Cattle Enterprise.....	712	461	1,717	1,350
	—dollars per animal unit—			
Capital Investment:				
Land.....	168	134	190	182
Buildings.....	154	162	110	110
Machinery.....	106	168	99	88
Livestock and Supplies.....	276	319	271	290
Total Capital.....	704	783	670	670
Cattle Enterprise Income.....	<u>115.13</u>	<u>131.81</u>	<u>112.57</u>	<u>132.74</u>
Expenses:				
Land, Building and Fence Expense.....	10.51	7.87	9.57	6.80
Machinery Operating Costs.....	15.09	11.33	12.47	8.61
Custom Work.....	3.20	1.43	1.36	1.85
Hired Labor.....	1.35	2.11	2.17	.71
Value of Feed Grain and Forage Used.....	9.52	14.57	5.97	14.31
Crop Expenses.....	1.45	2.22	1.74	1.80
Livestock Expenses.....	3.70	5.43	2.66	4.93
Other Cash Expenses.....	5.43	3.67	3.37	3.03
Total Cash Expenses.....	50.26	48.63	39.31	42.04
Machinery Depreciation.....	13.47	18.43	12.47	10.20
Building Depreciation.....	7.23	7.30	5.16	5.21
Total Cattle Enterprise Expenses.....	<u>70.96</u>	<u>74.36</u>	<u>56.94</u>	<u>57.45</u>
Family Farm Income.....	44.17	57.45	55.63	75.29
Less Value of Unpaid Labor.....	10.71	12.07	4.26	17.77
Operator and Capital Income.....	33.46	45.38	51.37	57.52
Less Interest (6½%) on Investment.....	45.74	50.92	43.56	43.50
Operator's Labor Income.....	-12.28	-5.54	7.81	14.02

- (a) Land, building and fence expenses;
- (b) Feed harvesting costs. This was particularly significant for the high grain groups.

However, even though the AC—HG group had a much higher gross income per animal unit than HC—AG, the operator and capital income was less —\$45.38 compared to \$51.37. In general, high operating expenses per unit were associated with small cattle enterprises. Increasing returns to size were reflected in the net incomes to the operators for labor and management. Similar results were obtained using \$100 of capital investment as a standard unit of comparison.

Grain Enterprise Income and Expenses

An operating statement analysis of the grain enterprises is summarized as follows (Table 7):

- (a) High grain enterprises had larger gross in-

comes per acre than the average grain enterprise groups.

- (b) Machinery operating costs per acre, including hired custom work and depreciation, declined progressively with increases in the size of grain enterprises. Also, land and building costs were lower per grain acre in high grain groups compared to those in average grain groups.
- (c) Consequently operator and capital incomes were much larger per grain acre on high grain enterprises than on their average grain counterparts. (Compare AC—HG with AC—AG and HC—HG with HC—AG).
- (d) Positive operator labor and management incomes, accrued to the large grain enterprises, but average size grain farmers suffered negative incomes for their labor and management.

TABLE 7—SUMMARY OF GRAIN ENTERPRISE INPUT-OUTPUT DATA ON GROUPS OF GRAIN-CATTLE FARMS, CENSUS DIVISION 4, SASKATCHEWAN, 1970

	Grain Enterprise Group			
	AC — AG	AC — HG	HC — AG	HC — HG
Number of Farms.....	16	9	11	8
Improved Acres to Grain Enterprise.....	401	1,238	471	1,510
	—dollars per grain acre—			
Capital Investment:				
Land.....	50	50	50	50
Buildings.....	9	8	8	6
Machinery.....	14	23	34	17
Other.....	^a	^a	^a	^a
Total Capital.....	73	81	82	73
Grain Enterprise Income.....	10.63	15.58	10.73	12.82
Expenses:				
Land and Building Expense.....	1.13	.87	1.16	.85
Machinery Operating Costs.....	2.39	1.58	2.13	1.37
Custom Work.....	.98	—	.17	.06
Hired Labor.....	—	.10	.20	.02
Value of Feed Grain Used.....	.73	.98	.95	.57
Crop Expenses.....	.23	.33	.30	.32
Livestock Expenses.....	.14	.11	.07	.01
Other Cash Expenses.....	.44	.31	.29	.24
Total Cash Expenses.....	6.04	4.28	5.27	3.44
Machinery Depreciation.....	1.96	2.70	3.22	2.24
Building Depreciation.....	.35	.32	.40	.26
Total Enterprise Expenses.....	8.35	7.30	8.89	5.94
Family Farm Income.....	2.28	8.28	1.84	6.88
Less Value of Unpaid Labor.....	.88	1.04	1.63	.73
Operator and Capital Income.....	1.40	7.24	.21	6.15
Less Interest (6½%) on Investment.....	4.75	5.26	5.34	4.76
Operator's Labor Income.....	-3.35	1.98	-5.13	1.39

^a Less than \$0.50.



OBSERVATIONS AND CONCLUSIONS

Farms in the average grain groups in Census Division 4 were too small to be economically self-sustaining. The analysis indicates that the cattle enterprise on such farms would have to increase substantially to make them economically viable. The grain enterprise on these farms, based on the yields obtained, should cease and the land used entirely for hay and pasture. Straw and grain could be purchased from grain farmers and land should be carefully assessed for increased grazing capacity. This could include improving both privately and publicly operated grazing land. Yield response to commercial fertilizer should be investigated thoroughly for irrigated forage production. Stopping grain production would cut machinery costs on cattle farms. Large tractors and combines would be unnecessary and existing smaller tractors, rakes and balers could be used to greater capacity on enlarged cattle-forage operations.

Grain emphasis farms in Census Division 4, on an average were large enough to be economically self-sustaining. The net return fully compensated the family labor and investment capital and provided and income for the operator's labor. Cattle could be combined successfully with grain enterprises on grain emphasis farms, up to rangeland capacity, for the following reasons:

- (a) Cereal grain was diverted to cattle finishing at a profit on large grain farms where financ-

ing was not a limiting factor. The increase in gross income exceeded the added costs of feed grain, cattle expense and family labor.

- (b) Machinery requirements on high-grain enterprises, to a large degree, were complementary to a cattle operation. Little additional machinery was required and consequently, equipment costs per unit of cattle production decreased as that enterprise expanded.
- (c) Labor resources were used more efficiently on grain emphasis farms as the cattle enterprise increased in size. An intensive yearling feeding program used labor during the winter that was surplus to the grain enterprise.

1. University of Saskatchewan, Soil Survey of Southern Saskatchewan, Soil Survey. Report No. 12, p. 22.

2. Acknowledgement is extended to members of Statistics Canada for their work in identifying the strata and selecting the sample segments in the area of study.

3. In this study the following were considered equivalent to one cattle unit; a cow or a two year old heifer, .75 herd bulls, 1.5 yearling steers or yearling heifers, 4 calves.

4. Average cattle—average grain and the abbreviated terminology (AC-AG) infers that the number of cattle units and grain acres on these farms approximates the averages for all grain-cattle farms in the area. High cattle—high grain farms (HC-HG) had more cattle units and grain acres than the average for the area.

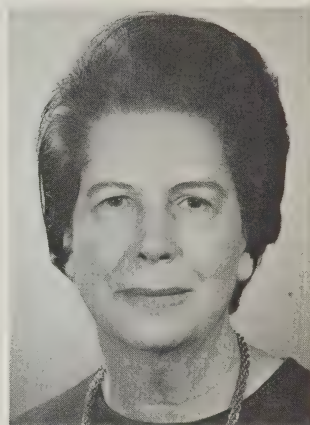
5. For a detailed treatment of the relative costs of producing these forages see J. K. Wiens and M. R. Kilcher, Winter Feed Production on Grain-Cattle Farms in Saskatchewan, *Canadian Farm Economics*, Volume 5, Number 6, February, 1971.

CONSUMPTION OF MILK, DAIRY PRODUCTS AND MARGARINE

More whole milk and butter are used by Quebecers than by other Canadians.

Maritimers consume the most canned milk and margarine but the least cheese, cream and ice cream.

In B.C. cheddar and cottage cheese have the highest per capita consumption; and Prairie people use the most cream.



*Veronica McCormick**

There is a wide variation in consumption patterns of milk, dairy products and margarine in the various regions of Canada. A 1969 study of food expenditures by Statistics Canada shows that the average per capita consumption of fluid milk (whole milk and partly skimmed) was highest in Ontario. British Columbia topped the list in per capita cheddar cheese consumption and Quebec had the highest butter intake per person. The Prairie Provinces were the largest users of half and half and fresh cream. Rural farm areas surpassed urban centres in consumption of ice cream (Table 1).

The survey included some 10,022 families across Canada. In addition to being divided regionally, the data were broken down by population groupings into several categories including "all urban centres", "urban centres 30,000 and over", "small urban centres", "all rural areas" and "all classes". This was the first food survey of national scope since 1949 and the first in Canada to provide separate data for families in urban and rural areas. Although the authors were primarily interested in family food expenditure, the survey also provided much valuable data on quantities consumed. The survey tables indicate average weekly expenditures and quantities per family and per person. In Table I, all statistics have been converted to a yearly basis per person and quantities bought are assumed to be roughly equivalent to consumption, except for fluid milk and cream in farm areas.

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The food expenditure study showed that the average per capita consumption of fluid milk (whole milk and partly skimmed) by volume was highest in Ontario at 102 quarts, followed by British Columbia at 88 quarts. The average for all Canada was 89 quarts per person. Quebec residents consumed the largest amount of whole milk, 71 quarts, but relatively little partly skimmed milk, 11 quarts. Ontario topped the list for consumption of partly skimmed milk at 45 quarts per person.

The Atlantic Provinces were the highest consumers of canned milk—evaporated and condensed—at 42 pounds per capita and Quebec was the lowest at eight pounds. Per capita intake of canned milk by population grouping in Canada was the highest in rural non-farm areas, likely reflecting the lower availability of fresh fluid milk and lower family income. The highest per capita intake of milk powder also occurred in rural non-farm areas.

In the study, the "cream" category was separated into modified cream or half and half, which generally contains about 10 percent butterfat, and other fresh cream which varies from 18 percent butterfat for table cream to 32 percent butterfat for whipping cream. The Prairie Provinces were the largest consumers of both half and half and fresh cream. British Columbia was the leading user of sour cream (about 18 percent butterfat).

Ontario and the Prairie Provinces were the largest consumers of ice cream at 18.6 pints. On the basis of population breakdown, rural areas outstripped all other classes at 20.9 pints of ice cream per person.

TABLE 1—AVERAGE ANNUAL PER CAPITA CONSUMPTION² OF CERTAIN DAIRY PRODUCTS AND MARGARINE, CANADA AND REGIONS, BY HOUSEHOLDS, 1969

	Milk		Canned Milk	Half & Half	Fresh Cream	Cheese			Cottage cheese	Butter	Margarine	Ice Cream	
	Whole	2%—1% —quarts—				Total Fluid ¹	Cheddar	Processed Cheddar					Other
All Classes													
Canada.....	60.4	28.3	88.7	13.1	1.5	1.1	3.7	2.4	2.1	1.6	14.4	8.7	17.5
Atlantic Region.....	62.4	6.6	69.0	42.1	0.7	0.8	3.0	1.4	1.1	0.4	11.3	13.4	14.4
Quebec.....	71.0	11.0	82.0	8.0	1.0	1.1	3.6	2.0	2.5	0.7	16.3	6.4	16.2
Ontario.....	56.7	45.1	101.8	9.1	1.1	1.1	3.9	2.8	2.4	2.4	14.6	8.0	18.6
Prairie Region.....	50.9	33.0	83.9	10.5	3.4	1.4	3.8	2.2	1.8	2.4	14.3	8.9	18.6
British Columbia.....	56.0	32.1	88.1	18.1	2.2	1.0	4.3	2.8	1.8	3.1	10.8	13.2	17.9
All Urban Centres													
Canada.....	64.1	32.5	96.6	10.3	1.7	1.2	3.6	2.5	2.3	1.8	14.2	8.0	17.2
Atlantic Region.....	76.3	9.9	86.2	30.9	0.8	1.0	2.7	1.8	1.2	0.5	12.2	12.1	15.0
Quebec.....	76.3	12.7	89.0	6.1	1.1	1.2	3.4	2.1	2.6	0.8	15.5	6.2	15.8
Ontario.....	57.6	47.7	105.3	8.7	1.2	1.2	3.8	2.9	2.5	2.1	14.4	7.4	18.4
Prairie Region.....	55.7	41.4	97.1	9.0	4.1	1.5	3.7	2.5	1.9	2.8	14.8	8.3	17.9
British Columbia.....	56.4	35.4	91.8	16.4	2.5	1.1	4.5	3.0	1.8	3.3	10.6	12.3	17.6
Urban Centres, 30,000 and Over													
Canada.....	64.1	34.4	98.5	8.4	1.8	1.2	3.7	2.6	2.4	1.9	14.0	7.5	16.6
Atlantic Region.....	75.4	12.1	87.5	24.5	0.8	1.1	2.6	2.1	1.2	0.4	12.7	10.3	13.3
Quebec.....	74.7	14.5	89.2	5.4	1.2	1.2	3.4	2.1	2.8	1.0	15.2	6.1	15.2
Ontario.....	58.5	49.8	108.3	7.6	1.4	1.2	3.8	3.1	2.6	2.2	13.8	6.9	17.8
Prairie Region.....	56.4	43.5	99.9	7.6	4.4	1.1	3.8	2.5	1.9	2.9	14.8	8.2	17.2
British Columbia.....	56.6	34.9	91.5	15.0	2.8	1.2	4.5	2.9	1.8	3.6	10.3	11.9	17.2

TABLE 1—AVERAGE ANNUAL PER CAPITA CONSUMPTION OF CERTAIN DAIRY PRODUCTS AND MARGARINE, CANADA AND REGIONS, BY HOUSEHOLDS, 1969
(Continued)

	Milk		Total Fluid ¹	Canned Milk	Half & Half	Fresh Cream	Cheese			Butter	Margarine	Ice Cream
	Whole	2%—1%		—lbs—	—pints—		Cheddar	Processed Cheddar	Other			
		—quarts—						—pounds—		—pounds—		—pints—
<i>Small Urban Centres</i>												
Canada.....	64.1	25.4	89.5	17.1	1.2	1.4	3.5	2.1	1.7	1.4	15.1	10.0
Atlantic Region.....	77.5	6.9	84.4	39.6	0.9	0.9	2.8	1.4	1.3	0.6	11.4	14.4
Quebec.....	84.8	2.9	87.7	9.7	0.9	1.7	3.3	1.9	1.8	0.2	17.3	6.9
Ontario.....	53.2	38.6	91.8	13.7	0.3	0.9	3.5	2.1	1.6	1.7	16.7	9.8
Prairie Region.....	53.7	35.7	89.4	13.0	3.1	2.4	3.2	2.3	1.9	2.5	14.7	8.8
British Columbia.....	55.7	37.0	92.7	20.3	1.7	0.6	4.5	3.2	1.7	2.3	11.2	13.4
<i>All Rural Areas</i>												
Canada.....	47.1	12.6	59.7	23.2	0.8	0.8	4.1	1.7	1.7	0.9	14.7	11.1
Atlantic Region.....	43.8	2.1	45.9	57.2	0.6	0.5	3.3	1.0	1.0	0.3	10.0	15.1
Quebec.....	49.8	4.2	54.0	15.7	0.3	0.7	4.4	1.5	2.0	0.1	19.2	2.5
Ontario.....	51.7	30.0	81.7	11.6	0.7	0.7	4.5	2.4	2.0	1.7	15.6	10.8
Prairie Region.....	38.0	10.6	48.6	14.3	0.9	1.2	4.0	1.5	1.5	1.4	13.1	10.6
British Columbia.....	54.3	17.1	71.4	25.8	1.1	0.6	3.6	1.9	1.9	1.8	12.0	17.2
<i>Rural Non-Farm Areas</i>												
Canada.....	55.3	14.8	70.1	29.0	1.0	0.9	4.3	1.6	1.4	1.0	13.6	1.3
<i>Rural Farm Areas</i>												
Canada.....	32.0	8.7	40.7	12.5	0.4	0.6	3.6	1.9	2.1	0.7	16.7	8.4

¹ Excludes fresh skim and chocolate milk. ² Does not include home produced food.
Source: Statistics Canada, Family Food Expenditure, 1969, Volume 1.



Quebec householders consumed the most butter in Canada at 16.3 pounds per person, followed by Ontario at 14.6 pounds and the Prairie Region at 14.3 pounds. Residents of British Columbia consumed the least amount of butter at 10.8 pounds per capita. Householders in small urban centres and rural areas in Canada consumed more butter than those living in large urban centres, with Quebec exceeding all regions in all categories.

Margarine consumption was the highest in the Atlantic Provinces at 13.4 pounds per person, followed by British Columbia at 13.2 pounds. Quebec residents consumed the smallest quantity of margarine at 6.4 pounds per capita. The average consumption of margarine in Canada was 8.7 pounds per person.

Cheese consumption statistics are usually reported in three broad categories—cheddar; processed cheese, which is largely cheddar; and “other” cheese made from whole milk. British Columbia was the highest consumer of cheddar cheese at 4.3 pounds per capita, followed by Ontario at 3.9 pounds, and the Prairie Region at 3.8 pounds. The Atlantic Provinces were the lowest cheddar consumers.

Ontario and British Columbia were the largest consumers of processed cheese at 2.8 pounds per capita. The greatest demand nationally was in urban centres of 30,000 people and over. Quebec was the largest user of “other” type cheeses at 2.5 pounds per capita. In the “other” cheese category, urban centres of 30,000 and over also reported the greatest usage.



British Columbia's per capita consumption of cottage cheese was 3.1 pounds, almost double the Canadian

average and four and a half times greater than per capita consumption in Quebec. The Prairie Provinces were also large consumers of cottage cheese, while consumption in the Atlantic Region was very small.

Respondents co-operating in the food expenditure survey were asked to report average family income and the average number of persons living at home. The average family income for Canada was \$7,679 and the average number of people at home, 3.49 persons. Ontario had the highest family income at \$8,680 followed by British Columbia, \$7,867 Quebec, \$7,283 Prairie Region, \$6,931 and the Atlantic Region, \$5,927. The Atlantic Region had the largest average number of persons at home at 3.87 persons per household, and British Columbia the smallest at 3.2 persons.

POLICY AND PROGRAM DEVELOPMENTS IN CANADA

AGRICULTURAL PRODUCTS BOARD ACT

(Low Erucic Acid Rapeseed Purchase)

The Agricultural Products Board has been authorized to purchase up to 4,500,000 bushels of low erucic acid rapeseed. The Federal government has also authorized the Board to incur a loss relating to the above purchase and sale not exceeding 15 cents a bushel nor \$510,000 in total. (February 10, 1972)

This program was developed as an incentive for the conversion to low erucic acid rapeseed (LEAR) from regular rapeseed. The payments will average eight cents per bushel on 3.5 million bushels for domestic use and one million for export. This is to compensate for the low oil content of LEAR and therefore level off the returns between regular rapeseed and LEAR producers.

Agriculture Minister H. A. Olson pointed out early this year that "market prospects for LEAR have improved dramatically" and that "due to an exceptionally large crop in 1971, and in spite of record sales, Canada will have larger than normal carryover stocks of regular rapeseed. Any production of regular rapeseed in 1972" said Mr. Olson, "will only add to this carryover."

To take advantage of developing export markets, the program will provide for the creation of a one million bushel reserve of LEAR for exports. The assembling and holding costs of the reserve are estimated at 15 cents per bushel.

(Dehydrated Potato Purchase Program)

The Agricultural Products Board has been authorized to purchase by tender, to store, transport, process or package quantities of dehydrated potatoes at a total cost not exceeding \$1 million. The Agricultural Products Board will not incur any loss on the above purchase and will sell the product to the Canadian International Development Agency. (February 10, 1972)

AGRICULTURAL STABILIZATION ACT

(Price of Fresh Apples Stabilization Order)

For stabilization purposes, the prescribed price of fresh apples has been set at 90.3 percent of the base price. Support to apple producers selling to the fresh

market will come in the form of a grant for apple promotion.

The Agricultural Stabilization Board will make a \$114,000 payment to the Canadian Horticultural Council to promote domestic apple consumption. Producers now pay a levy for apple promotion purposes. This grant, distributed to the apple marketing agencies of each province, will be used to reduce their payments and therefore improve producer returns. (November 9, 1972)

(Prices of Fresh Blueberries Stabilization Order)

The Agricultural Stabilization Board will pay producers 1.5 cents a pound for blueberries delivered to distributors and processors from August 16, 1971 to October 15, 1971. These payments were calculated following a prescribed price of 105.5 percent of the base price.

The payment will be paid to producers who furnish proof of sales to distributors and processors. (November 9, 1971)

(Price of Fresh Carrots Stabilization Order)

The prescribed price of fresh carrots has been set at 93.4 percent of the base price. The Agricultural Stabilization Board will pay distributors, for the benefit of producers, 0.5 cents a pound for fresh carrots delivered to them from August 16, 1971 to April 30, 1972. The Board may refuse to make a payment to any distributor if the purchase price paid by the distributor to producers during that period was less than the prescribed price of that period.

The Board has been authorized to make such payments for an amount not exceeding \$278,000. (December 21, 1971)

(Price of Fresh Rutabagas Stabilization Order)

The prescribed price of fresh rutabagas has been set at 83.3 percent of the base price. The Agricultural Stabilization Board will pay distributors, for the benefit of producers, 0.24 cents a pound for fresh rutabagas delivered to them from August 16, 1971 to December 31, 1971.

The Board has been authorized to make such payments for an amount not exceeding \$130,000. (December 21, 1971)

AGRICULTURAL PRODUCTS CO-OPERATIVE MARKETING ACT

(L'Association des producteurs de semences de Bagot)

Under authority of the Agricultural Products Co-operative Marketing Act, the Minister of Agriculture has entered into an agreement for the marketing of a quantity of grain corn produced in 1971 in the Province of Quebec, with "l'Association des producteurs de semences de Bagot", Province of Quebec.

The Processor (L'Association des producteurs) will market corn under a co-operative plan on the basis of three grade pools: No.'s 1 and 2 Canada Eastern corn, No.'s 3 and 4 Canada Eastern corn, and No. 5 and lower grades. The initial payments will be 90 cents, 80 cents and 75 cents a bushel, on a 14% moisture content basis. Any further payment will have to be authorized by the Governor in Council.

If the Processor were to incur a loss, the Minister undertakes to pay the difference between the average wholesale price realized for such corn, and the initial payments together with the actual average carrying and selling costs (these not exceeding five cents per bushel for carrying and three cents for selling).

This agreement will remain effective until May 1, 1972 or such later date as the Minister may prescribe. (November 30, 1971)

(Coopérative Monteregienne)

The Minister of Agriculture has entered into an agreement with the "Coopérative Monteregienne" of Rougemont, Quebec, for the marketing of apples produced in Quebec in 1971. The co-operative will process and sell apples in the form of apple juice, apple pulp and apple jelly.

The Processor will pay primary producers an initial payment of 40 cents per 45 pound bushel for apples graded "Canada Commercial" or better, although 15 percent of the apples in any lot may be below that grade.

The Processor agrees that at least 90 percent of the total production will meet the requirements of

Canada Choice grade or better, and that all production under this agreement will be sold on or before December 31, 1972.

If the average wholesale price realized for apples meeting the above mentioned specifications is below \$3.55 per bushel, the Minister agrees to pay the difference to the Processor.

This Agreement is retroactive to August 15, 1971, and will be in effect as long as apples are delivered in sufficient quantities to permit the practical operation of the plant. (February 10, 1972)

(Final Payments to Ontario Bean Producers' Marketing Board)

Following the 1970 bean marketing agreement, primary producers who delivered to the Ontario Bean Producers' Marketing Board will receive final payments of \$1.51 per hundredweight for pea beans, and \$6.46 per hundredweight for yellow-eye beans. (January 18, 1972)

AGRICULTURAL PRODUCTS MARKETING ACT

(Prince Edward Island Milk Order)

Prince Edward Island has joined Quebec and Ontario, in the market sharing agreement, becoming the third province to enter into the national supply management program for manufacturing milk and cream. Market sharing quotas have been effective since December 1, 1971. The initial quotas were based on each producer's deliveries in the previous year or his federal subsidy eligibility quota, whichever was greater. (December 1, 1971)

CANADA AGRICULTURAL PRODUCTS STANDARDS ACT

(Processed Fruit and Vegetable Regulations)

The last regulations for fruit and vegetables processing were issued under authority of the Canada Agricultural Products Standards Act in 1961. A revised set of regulations has now been prepared by Canada Agriculture and has been printed in *Canada Gazette*. (December, 1971)

(HOG DEFICIENCY PAYMENT)

The Federal government will pay hog producers up to \$1000 each to offset low prices in 1971. The payment will be \$5 per hog for all hogs indexing 100 or higher to a maximum of 200 hogs per farmer.

Prices were driven down in North America when production soared to record-breaking levels. In 1971, Canada-U.S. hog slaughter showed an increase of 11.5 percent over 1970, or 9,953,000 head—1,465,000 in Canada, 8,488,000 in the U.S. The U.S. therefore accounted for 85.3 percent of the increase, western Canada 10.6 percent and eastern Canada 4.1 percent. The national weighted price in 1971 was \$23.67 per hundredweight; the support price (80 percent of the 10-year average) is \$24.14 per hundredweight. That leaves a deficiency of 47 cents per hundredweight to be paid by the Agricultural Stabilization Board.

The Minister of Agriculture, Mr. Olson, pointed out that "the payment of \$5 per hog indexing 100 or more means hog farmers will receive more money from the federal government than they would under strict application of the formula".

The deficiency payment will be made to farmers by the Agricultural Stabilization Board. Farmers must submit original hog carcass grading certificates with their application forms. (February 3, 1972)

(SUGAR BEET DEFICIENCY PAYMENT)

A deficiency payment of 86 cents per standard ton will be paid on the 1970 sugar beet crop. The support price for the 1970 sugar beet crop was \$15.98 per standard ton (250 pounds of sugar).

Payments to growers in Manitoba, Alberta and Quebec will amount to about \$746,000. The deficiency payment rate is lower this year as a result of the improvement that took place in the world price of sugar in 1970 and which was reflected in generally better prices received by Canadian sugar beet growers. (December 10, 1971)

(POTATO PURCHASE PROGRAM)

For a while in early January, the volume of potatoes offered to the Stabilization Board was too limited to permit the Board to enter into contracts or arrangements for alternate use. But later, agreement was reached with Valley Co-operative Starch Plant, Grand Falls, N.B., for diversion of potatoes to starch. The Canadian government, through the Canadian International Development Agency, also purchased an estimated four million pounds of dehydrated potatoes for donation to the World Food Program.

While the Board wishes to take delivery of the potatoes and divert them to alternate use at the

earliest possible date, the volume of potatoes offered may necessitate holding them in producers' storage until or beyond April 15.

In any case, the Board will assume responsibility for deterioration of potatoes still in storage and awaiting delivery instructions after April 15. However, they must be segregated by the producer from other stocks being held in the same storage and clearly identifiable as stocks committed to the Board.

The Board emphasizes that potatoes purchased under the program will not be placed on the domestic market to the detriment of Canadian producers.

(CHANGES IN THE DAIRY OVER-QUOTA HOLDBACK)

The Canadian Dairy Commission's holdback on payments to shippers of manufacturing milk and cream have been changed again to improve the returns of dairy producers.

In provinces under market sharing quotas, a producer may now exceed his market quota by 10 percent before the over-quota holdback will take effect. In other provinces, a producer may now exceed his subsidy quota by 30 percent.

In provinces not under market sharing quota, the holdback is made from direct federal subsidy payments, based on each producer's subsidy quota. If all provinces were under market sharing quotas, the national total of the subsidy quotas would be about 70 percent of the total market sharing quotas.

This arrangement was made for the dairy year ending March 31, 1972. (December 30, 1971)

(REINSTATEMENT OF SUBSIDY QUOTAS)

Shippers who held a subsidy eligibility quota at any time since 1967, but whose eligibility for quota was later withdrawn because they delivered less than 420 pounds of butterfat in a year may again become eligible for subsidy.

The new arrangement will start in the present dairy year. Those whose quotas were withdrawn previously and delivered 420 pounds or more between April 1, 1971 and March 31, 1972 will be paid subsidy on their deliveries up to their quotas.

The payment for this year will be made at the end of the year, but for next year they will be reinstated

for the regular subsidy payments on their monthly deliveries.

The same procedure of reinstatement will follow in subsequent years. (December 31, 1971)

(NEW WHEAT GRADES)

Five new grades of wheat will be introduced on August 1, completing a conversion to new grades which began last year.

The first new grade introduced was Canada No. 1 Western Red Spring Wheat. The grades that will be introduced at the start of the 1972-73 crop year are Canada No. 2 and No. 3 Western Red Spring and three Utility grades.

Canada No. 2 Western Red Spring Wheat will include the old grades No. 3 and the best of the No. 4 Northern. Canada No. 3 Western Red Spring Wheat will include the bulk of the grain that was covered by the old No. 4 Northern grade.

No. 1 and No. 2 Utility grades will provide two levels of quality for types or varieties of wheat such as Pitic 62 that are licensed and produced primarily

for non-milling commercial uses. No. 3 Utility will be for wheat that does not meet the standards of the other higher grades. (February 8, 1972)

CANADA'S PLEDGE TO THE WORLD FOOD PROGRAM

Canada pledged a donation of \$34 million to the World Food Program to cover the years 1973 and 1974. The pledge was made by Agriculture Minister H. A. Olson at the Pledging Conference held at New York.

The pledge has been increased by \$4 million from Canada's last pledge made two years ago. It will consist of \$7,480,000 in cash and the balance in food.

The World Food Program which is jointly run by the United Nations and the Food and Agriculture Organization, has experienced some difficulty in achieving an appropriate protein-calorie balance in the food aid it offers. Mr. Olson said that Canada's food contributions will continue to aim for an improvement in this balance.

Canada has consistently been the second largest contributor to the World Food Program since it started in 1962. (January 31, 1972)

DEVELOPMENTS ABROAD

Highlights from "Spot News from Abroad", the newsletter issued by the International Liaison Service of the Canada Department of Agriculture, in co-operation with the Trade Commissioner Service of the Department of Industry, Trade and Commerce.

Grains

India Self-sufficient in Food grain

The Indian government has stopped all concessional foodgrain imports from the U.S. from January 1, 1972 under U.S. Public Law 480. India produced a record 107.81 million tons of food-grain in the 1970-71 season, making it self-sufficient for the first time. This year the crop is expected to produce 113 million tons.

India has been one of the largest importers of wheat from the U.S. for the past 16 years, but the government had pledged to stop all concessional foodgrain imports by the end of 1971. With a wheat crop of 23.5 million tons last year, the Indian government is planning to export wheat products for the first

time from July, largely to Middle East countries. [The Public Ledger, January 15, 1972, London]

Mexico Wheat Shortage

Mexico exported wheat continuously from 1963 to 1970, but national production in 1971 did not meet internal demand and a deficit estimated at 400,000 tons occurred. This situation originated in the plan to increase the cultivation of oil-producing plants and to reduce those crops providing a surplus.

The area devoted to wheat was reduced by 100,000 hectares, representing a yield of 320,000 tons; safflower, sunflower, soybeans and other oil plants with insufficient production, were substituted. In order to cover the wheat deficit, a program to buy wheat at planned intervals was begun in September, 1971

with the purchase of 99,000 tons. [Review of the Economic Situation of Mexico, December 1971]

U.S. Corn Planting Intentions

According to the USDA report on Planting Intentions, farmers expect to cut corn acreage only four percent this year. With a normal growing season, the average yield should be at least 82 bushels per acre, the average for the past five years, with the blight year taken out. Such a yield on the indicated acreage would produce about five billion bushels, which would probably be about 100 million bushels more than the amount that would be used and exported during the 1972-73 marketing year. [Illinois Farmers' Outlook Letter, February 2, 1972]

Corn as a Feed Crop in Britain

Corn growing on a commercial scale started in Britain in 1966. In 1971, 10,000 acres of corn were being grown—8,000 for silage and 2,000 for grain—and acreage is expected to double next year. Corn growing has spread from northern France—where the acreage is now over a million—to southern England. A Bristol firm is co-operating with a leading Dutch seed firm to establish new varieties of corn and to develop varieties which can be grown further northwards. [Feed & Farm Supplies, London, December 1971]

Livestock

Australia—Exports of Beef

The Australian Bureau of Census and Statistics has released figures which show beef as Australia's major export income earner during the first quarter of 1971-72. This was a peak export period for beef, especially from northern Australia, with sales worth nearly \$A121 million.

Australia has been supplying about 90 percent of Japan's beef imports, incorporating a full range of products. Increasing trade in chilled beef, however, occurred during the past year, and this is expected to become an even more significant feature in the future if Australia's ability to meet the discerning demands of the Japanese for table quality beef is fully realized. Japan is Australia's second most important export outlet of beef. [Canadian Assistant Commercial Secretary, Melbourne]

Dairy Products

U.S.—Milk Prices

Early January prices paid by dealers for milk used for fluid purposes (Class I) averaged \$7.19 per hundredweight for about 150 markets, according to the USDA Crop Reporting Board. This was nine cents above a year earlier. Regional gains from a year earlier ranged from three cents in the West South Central Region to 21 cents in the Pacific Region. Prices in the East South Central Region averaged one cent below a year ago.

Store prices to consumer in 25 major cities in early January averaged, 57.8 cents per half gallon for the most common grade of milk, the same as a year earlier.

Early January prices for home-delivered milk averaged 67.9 cents per half gallon for 25 major cities. This was 2.3 cents above January 1971. Home-delivered prices represent list prices before deduction for quantity and other discounts. [USDA]

Oilseeds

Australia—Rapeseed

Australia is reported to be serious about developing rapeseed production. Some short-term projections seem rather optimistic, but there is little doubt that acreage in the States of Victoria and New South Wales will probably yield a harvest large enough to permit Australia to get into the export market. Also, there is little doubt that Australian exports will focus on Japan. [International Federation of Agricultural Producers, News, January 1972]

Fruit and Vegetables

Mobile Packing for Commercial Vegetables

A mobile 'packing station', claimed to be the most versatile of its kind, helps speed the harvesting, grading and packing of commercial vegetable crops. The British makers claim that its use will not only speed the crops to market but can cut labor costs by up to 60 percent. The machine consists of a framework which can be attached to a tractor by two unskilled men in less than 30 minutes and carries a front-mounted boom with two independent conveyor belts working toward the centre of the machine.

In operation, the men or women harvesting the crop and working along the rows on either side put the crop on the conveyor belts from which it is transferred to a third belt which carries it to a platform at the back of the machine. Here it is received by other operators who clean, trim, grade and pack it into crates ready for transport from the farm. Trials have proven very successful with such crops as lettuce, cabbage and cauliflower. [British Farming, December 24, 1971]

General

EEC Farm Prices 1972-73

The EEC Commission is to ask the Council of Ministers to increase the agricultural prices for 1972-73 by eight percent instead of the two to three percent proposed earlier according to a statement made by Dr. Mansholt at a press conference in Brussels in December. This is still considerably less than the 12 percent requested by COPA, the EEC farmers' union. Later it was announced that the proposed increases would range between five and eight percent. Figures mentioned included 13.2 percent for beef spread over two years, eight percent for milk and as much as 20 percent for milk powder. At the lower end of the scale were 3.4 percent for husked rice, sugar and oilseed, 4.1 percent for pork and 2.4 percent for veal.

Relations with the U.S.A. will have to be considered when fixing the new prices, particularly those in the cereal sector. The U.S.A. would like cereal prices reduced to near those of the world market but the Commission wants an increase of about five percent. The possibility that the Council of Ministers will revalue the unit of account when the new parity

rates become official must also be taken into account as this would bring about an automatic increase in farm prices. [Agra Europe, January 5, 1972]

U.S. Farm Exports

After setting a calendar-year high of \$7.2 billion in 1970, U.S. farm exports reached a new fiscal year record of \$7.8 billion in 1970-71. This latest record tops the former one of 1966-67 by \$988 million and is 15 percent greater than the U.S. farm export value in 1969-70.

More than 62 percent of the rice produced in 1970 was shipped overseas, along with 53 percent of the soybeans and wheat, 35 percent of the tobacco, 36 percent of the cotton, 41 percent of the tallow, and 44 percent of the hides and skins. [Agricultural Situation, USDA, December 1971]

Vacation for Norway Farmers and Fishermen

Norway is about to put into effect a novel measure of social legislation providing a vacation plan for farmers and fishermen. The Storting unanimously approved the same right to a paid vacation that had been afforded other working groups by virtue of the Vacation Act of 1947. The new plan was proposed by the government on April 19, 1971.

On the basis of recommendations from a specially appointed committee, each farmer will be paid a certain amount of money for vacation purposes. The exact amount will depend on the total agricultural income of the farm (non-agricultural income will not be included when the vacation pay is computed). The plan is designed to cover the farmer and his wife. [International Federation of Agricultural Producers, News, January, 1972]

PUBLICATIONS

ECONOMICS BRANCH PUBLICATIONS

Machinery Costs in Central Alberta. Machinery costs on Parkland grain-cattle farms in Central Alberta. L. M. Johnson. Prairie Regional Office, Economics Branch, CDA, Torwest Tower, Regina, Saskatchewan. December 1971. Tables. Pub. No. 71/16.

Prairie Regional Studies in Economic Geography—No. 8 The Brandon-Neepawa Region of Manitoba. J. W. Channon, K. J. Morison. Economics Branch, CDA. January 1972. Pub. No. 71/15.

CANADA DEPARTMENT OF AGRICULTURE PUBLICATIONS

Available from Information Division, CDA, Ottawa, Canada, K1A 0C5

Annual Report, 1970/1971. Canada Department of Agriculture, Ottawa, 1971. 73 p. Tables, organization chart. (Also French). Cat. No. A1-1971. Free.

Report of the Board of Grain Commissioners for Canada, 1970. Ottawa, 1971. 49 p. Tables, organization chart. Cat. No. A-91-1/1970. Free

This report contains a review of the Board's principal activities during the year, together with information and statistics relating to quality and volume of grain handled through the Canadian licensed elevator system during the 1969/70 crop year, and a review of the quality of 1970 grain crops.

Farm Letter. Ottawa, 1971. Bilingual. Free. No. 66 *United States Import Surcharge.* Aug.-Sept.-Oct. No. 67 *Outlook 1972.* Nov.-Dec.

Canada and FAO. Ottawa, 1971. 103 p. Pictures, graphs, organization chart. Cat. No. A73-1453. Free.

Economics of Swine Production. R. J. Bens and A. G. Wilson. Prepared under the Direction of the Sask. Advisory Council on Animal Production. Ottawa, 1971. 37 p. Graphs, tables. Pub. No. 1442.

Federal Farm Credit and Related Statistics. Farm Credit Corporation, Sir John Carling Building, P.O. Box 4209, Postal Station E, Ottawa, K1S 5A6.

Ottawa, 1971. 64 p. Tables, charts. Bilingual. Cat. No. A96-2/1971. Free.

GOVERNMENT OF CANADA PUBLICATIONS

Available from Information Canada, 171 Slater Street, Ottawa, K1A 0S9.

Concentration in the Manufacturing Industries of Canada. The Department of Consumer and Corporate Affairs. Ottawa, 1971. Tables. 275 p. Cat. No. RG52-371 Free.

Performance in Perspective, 1971. Economic Council of Canada. Ottawa, 1971. 79 p. Tables, charts. Cat. No. EC21-1/1971-1. Price \$1.50
Contents: The External Environment; Performance in Relation to Goals and Potentials; Trade and Balance of Payments; A Major Challenge for the 1970's—Job Creation.

Multinational Firm, Foreign Direct Investment, and Canadian Science Policy. Science Council Study No. 22. Arthur F. Cordell. Ottawa, 1971. 95 p. Tables, charts, organization chart. Cat. No. SS21-1/22. Price \$1.50.

Health Protection and Food Laws. The Department of National Health and Welfare. Ottawa, 1971. 48 p. Cat. No. H-44-3172.

Resource Satellites and Remote Airborne Sensing for Canada. Report No. 2 Agriculture and Geography. The Department of Energy, Mines and Resources, Ottawa, 1971. 23 p. Cat. No. M75-2/2.

STATISTICS CANADA PUBLICATIONS

Available from the Publications Distribution Unit, Ottawa 3, Canada

1971 Census Catalogue. First edition. Population—Housing—Agriculture—Employment. Ottawa, 1972. Bilingual. Cat. No. 11-506. Free.

Greenhouse Industry, 1969-1970. Ottawa, 1971. 24 p. Tables, chart. Bilingual. Cat. No. 22-202/1970. Price 50¢ per copy. Number of establishments, area under glass, value of sales, flower production by

type of crop; financial statistics; Canada and the provinces.

Survey of Canadian Nursery Trades Industry, 1969-70. Ottawa, 1972. 27 p. Tables, charts. Bilingual. Cat. No. 22-203/1970. Price 50¢ per copy.

Leaf Tobacco Acreage, Production and Value, 1970. Ottawa, 1971. 3 p. Bilingual. Cat. No. 22-205/1970. Price 25¢ per copy.

Livestock and Animal Products Statistics, 1970. Ottawa, 1971. 89 p. Tables, charts. Bilingual. Cat. No. 23-203/1970. Price \$1.00. Detailed statistical coverage of livestock population, marketings, meat stocks, wool, hides, and other animal products.

Report on Fur Farms, 1970. Ottawa, 1972. 18 p. Bilingual. Cat. No. 23-208/1970. Price 50¢ per copy. Number of fur farms and fur animals, number and value of pelts taken by provinces and kinds, exports and imports.

Feed Manufacturers, 1969. Annual census of manufacturers. Ottawa, 1971. 12 p. Bilingual. Cat. No. 32-214. Price 50¢ per copy.

Miscellaneous Food Industries, 1969. Annual census of manufacturers. Ottawa, 1971. 11 p. Bilingual. Cat. No. 32-224/1969. Price 50¢ per copy.

Apparent per Capita Domestic Disappearance of Food in Canada, 1970. Ottawa, 1972. 7 p. Cat. No. 32-226. Price 25¢ per copy.

FAO, OECD and U.N. PUBLICATIONS

Available from Information Canada

The State of Food and Agriculture, 1971. FAO, Rome, 1971. 234 p. Tables, maps. Cat. No. PP/B6720/11.71/E/1/6500. Price \$10.00 (U.S.)
Note a special chapter on: Water Pollution and its Effects on Living Aquatic Resources and Fisheries.

Global Environmental Monitoring. A group of leading international scientists has called on the United Nations to help set up a global network of scientific stations to monitor the environment, from the tropics to the polar ice-caps.

The call comes from a 27-member specialist committee of the International Council of Scientific Unions (ICSU) in a report to the Secretary General of the

United Nations. Conference on the Human Environment.

Following this report, monitoring should initially concentrate on two priority areas: assessing changes in the world's climate and surveying the degree of pollution. A series of pilot programmes that cannot be confined to the network of monitory stations is also called for in the report. These include studies of vegetation, soil conditions and wildlife. Copies can be ordered from: Editorial Service, Swedish Natural Science Research Council, Wenner-Gren Centre, Box 23136 S-104, 35 Stockholm 23, Sweden. Price \$(U.S.) 2.00

Manual on the Use of FAO Specifications for Plant Protection Products. Agricultural Development Paper No. 93. FAO, Rome, 1971. 46 p. Cat. No. PS/B2321/5.71/E/1/3800. Price \$(U.S.) 1.50.

OTHER PUBLICATIONS

Maritime Forage Production Costs and Maritime Grain Production Costs. Prepared by J. Lovering, D. MacMinn and G. Ryle, a coordinating group of the Atlantic Farm Management Committee, Truro, Nova Scotia, June 1970. 29 p. and 24 p. Tables.

Estimating Production Costs for Maritime Swine Enterprises. Prepared by J. Lovering and D. MacMinn for the Atlantic Agricultural Economics Committee. Charlottetown, P.E.I. June, 1971. 43 p. Tables. These three studies are available from the New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland Departments of Agriculture.

List of Publications 1971-1972. New Brunswick Department of Agriculture and Rural Development, Fredericton, N.B.

Report of the Royal Commission on the Milk Industry in New Brunswick, 1970-71. Fredericton, N.B., 1971. 198 p. Tables, chart.

Agricultural Statistics, 1971. New Brunswick Department of Agriculture and Rural Development. Fredericton, N.B., 1971. 64 p. Tables

Ontario Dairy Herd Improvement—Business Summary 1970. Economics Branch, Ontario Department of Agriculture and Food, Parliament Buildings, Toronto, Ontario. December, 1971. 28 p. Tables.

The following titles are distributed by the Information Division of the Ontario Department of Agriculture and Food.

Maple Syrup Production in Ontario. Production costs, returns and management. W. J. Dillon. May, 1971. 63 p. Tables, graphs.

Farm Machinery Operating Costs. Schedules of rates for different types of machines in Ontario. W. J. Dillon. August, 1971. 30 p. Tables. Bibliography.

Economics of Processing Tomato Production in Ontario 1966-1970. G. A. Fisher. May, 1971. Tables.

Greenhouse Vegetable Production in Essex County. Production costs, returns and management practices. G. A. Fisher and Paul Hedlin. February, 1971.

Economics of Storage and Spreading of Liquid Manure for Feeder Hogs in Ontario. September, 1971. 14 p.

Spring Grain in Ontario. Production costs, returns and management. October, 1971.

Strawberries in Ontario. Factsheet—Production costs, returns and management practices. June, 1971.

Raspberries in Ontario. Factsheet—Production costs, returns and management practices. February, 1971.

Rural Families and Their Homes. A longitudinal study of Ontario rural families. Helen C. Abell. School of Urban and Regional Planning, University of Waterloo, Ontario. November, 1971. 66 p. plus 15 p. Appendix. Tables. On request from the University of Waterloo Bookstore at \$2.50 plus postage.

An Economic Analysis of the Market for Canadian Rapeseed. H. B. Huff and D. P. Stonehouse. School of Agricultural Economics, University of Guelph, Guelph, Ontario. January, 1972. 33 p. Tables, graphs. Bibliography. Working paper AE/72/2.

Incorporation of Family Farms in Saskatchewan. L. E. Minogue, L. N. Elmgren and J. A. Brown. Department of Agricultural Economics, University of Saskatchewan, Saskatoon, 1971. 46 p.

The Prairie Community System. C. C. Zimmerman and G. W. Moneo. Agricultural Economics Research Council of Canada, 55 Parkdale Ave., Ottawa, K1Y 1E5. June, 1971. 119 p. Maps. Bibliography. Price \$3.50.

American Bibliography of Agricultural Economics. American Agricultural Economics Documentation. Center. Vol. 1, No. 1 AAEDC, Room 1505 S., U.S. Department of Agriculture, Washington, D.C., 20250. July, 1971. 50 p. This bibliography is a categorized listing with citations arranged alphabetically by author under major headings. It also includes Canadian titles.

CORRECTIONS

Volume 6, Number 5, December 1971

Column 2, line 16—"million" should read "billion".

Column 1, line 7—"70" should read "570".

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